1950:52

File No. 3099/48

P.W. DEPARTMENT

B CLASS G BRANCH

Subject:—Printed

Question papers
set at Professional Examinations
of Assistant-Engineers (I) Deputy Engineers.
in the B.S.E. Class I & II
for the year
'950-51 & '952

B-[K]-1952

V

File No. 3094-148-G

Sta. Deptt. Slip 24-A

Correspondence

Sectt 78 A e

[Serial 3 -50,000 -5.54
No. 2108, dated 22-6-22.]

DOCKET SHEET (B)

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Subject:—

P. & V DEPT.

Y BRANCH.

References:—

The 50 printed set of Question Papers has also been sent to Maharashtra & Gujarat & papers underlined thus are in B'Bay

Date.	To whom sent.	Notes instructions,

uestion Papers set at the Professional Examinations of Assistant and Deputy Engineers held in the Year 1952

[*For official use only*]

BOMBAY

PRINTED AT THE GOVERNMENT CENTRAL PRESS

1954

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEER, B. S. E., CLASS I

CENTRAL CIRCLE

General Engineering—Connected with Water Supply and Sanitary Engineering (Written)

MONDAY, 13th OCTOBER 1952

[11 A.M. TO 2 P.M.]

N.B.—Eight questions to be answered.

Marks.

1. What survey plans and field information and other data are required for the preparation of a comprehensive drainage scheme of a growing industrial town? The sewers are to be constructed on the basis of partially combined flow. 9

2. Sketch in detail, the sanitary arrangements required for a two storied residential building with a water-closet, a wash hand basin and a nahani on each floor. 9

3. What is the procedure followed in the design of pipe line distribution system so that there may be uniformity of pressure and equitable supply of water to all consumers inspite of diversity of distance and elevation of the points of supply. 9

4. How will you take a recuperation test for infiltration works in a river bed which has 15' depth of sand and soil below. The above river has a minimum hot weather discharge of 50 cusecs. What rate of infiltration can you expect in this river. 10

5. How are the physical, chemical and bacteriological features of a water judged from a sanitary analysis of the water. What are the accepted standards in regard to these for public water supplies. 9

6. Give chemical analysis of water from a tube well 400 ft. deep in north Gujrat and also for a surface water of a Nalla having hilly catchment in the Deccan trap region. State from the above analysis if the water can be allowed for public water supplies. 10

7. An in type R. C. elevated reservoir of 1 lakh gallons capacity is to be constructed for a town in Gujerat. The trial pit results at the site of the reservoir show 6 feet deep black cotton soil and good yellow soil below. Design the footing for the R. C. Columns. Height of columns above ground is 40 feet. 10

Marks.

8. What labour will you employ for laying 300 feet of 30" diameter hume steel pipe gravity main. Write out a schedule of cost for laying and jointing the above pipe line including all material except pipes. 9

9. What is an aqua privy ? Give a dimensioned sketch of a two seated aqua privy. Work out the estimate of such a privy excluding superstructure. 9

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

CENTRAL CIRCLE

General Engineering connected with Water Supply and Sanitary Engineering (Oral)

MONDAY, 13TH OCTOBER 1952.

Marks.

1. State the working costs of the following :— 8

(*a*) A 3 ton lorry per day transporting rubble stone over a load of 2 miles, manual loading and unloading.

(*b*) A 10 ton road roller on consolidation of road embankment per day.

(*c*) A two drum sheeps foot roller driven by a suitable tractor per day.

2. What are the fundamental uses of the following in an earthen dam :— 9

(*a*) Puddle trench.
(*b*) Down stream rock toe.
(*c*) Metal behind pitching.
(*d*) Filter.

3. Give rates for the following in your District :— 8

(*a*) Rubble for masonry work at work site—10 miles from quarry.

(*b*) Lime plaster including fine coat of neeru.

(*c*) Sand and cement mortar 4 : 1 proportion.

4. (*a*) How many cubic yard of heaped soil excavated by a Shovel will make a five ton load. 8

(*b*) How many blast holes each 30" deep can be taken in 8 hours working day by a compressed air drilling equipment.

Marks.

5. What is a motor grader ? What are its uses ? Will you recommend it for the construction of village approach roads in a hilly area. 8

6. What are the present day rates for the following :— 9

(*a*) Light Diesel oil.

(*b*) High grade lubricating oil.

(*c*) Alumina Sulphate.

7. What outturn you would expect as a task duty for the following per day :— 8

(*a*) Excavation in wet soil lift 10 ft. lead 100 ft.

(*b*) White washing 3 coats.

(*c*) Cement plaster 3/4" thick.

8. How many 18" diameter 12 feet long C. I. pipes can be carried in a 5 ton truck. How many table moulded bricks will be carried in the same truck. How many gallons of diesel oil will come in 10 ton oil tanker ? 9

9. What is optimum moisture ? What are the effects of departure from such moisture contents in the construction of a Dam. 8

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

General Engineering connected with the Design and Construction of Earthen Dams (Written)

MONDAY, 13TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. What are the main differences between fat lime, hydraulic lime and Kankar ? If kankar is not available give methods of rendering fat lime hydraulic. 9

2. Describe different types of pointing to masonry and state (giving reasons) which of them is the best. 7

3. Explain the indirect advantages from an Irrigation scheme. 8

4. State the possible reasons for failure of earthen dams and precautions to be taken to prevent them. 9

Marks.

5. Name different types of earth moving machinery and describe in detail the working of one of them. 9

6. Give safe permissible loads on the following types of soils :— 8

(*a*) Wet and marshy clay.
(*b*) Black cotton soil.
(*c*) Compact sand.
(*d*) Murum.
(*e*) Red earth.
(*f*) Compact clay (nearly dry).

7. Describe the organisation which would be necessary in carrying out departmentally the work of an earthen dam costing Rs. 2 crores. What supervising staff will be needed if the work is given out on contract ? 9

8. State different types of lime kilns describing one of them with sketches. 7

9. What precautions you would take against accidents from blasting operations ? 9

Total 75

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

General Engineering connected with the Design and Construction of Earthen Dams (Oral)

MONDAY, 13TH OCTOBER 1952

[3 P.M. ONWARDS]

Marks.

1. (*a*) What is surkhi mortar ? 8

(*b*) What is its advantage over cement mortar.

(*c*) What compressive strength does it develop after about 3 months.

2. What kind of strata is required to be stripped off, under the seat of an earthen dam ? 8

3. State the principal types of soils required in the design of earthen dams. 9

4. Mention different zones in the earthen dam. 9

Marks.

5. (i) How would you carry slump test of concrete ? 8

(ii) What maximum slump is recommended for concrete used in R. C. C. work.

6. What are the advantages and disadvantages of syphon spillways ? 9

7. What "Duty" will you adopt for the following crops at the head of the canal ? :— 8

(1) Sugarcane.
(2) Rice.
(3) Wheat.
(4) Plantains.

8. What is a multi-purpose river valley project ? What are the maximum possible advantages which can be derived from such a project. 8

9. Define "capacity factor" of an irrigation canal. 8

Total .. 75

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

CENTRAL CIRCLE

Water Supply and Sanitary Engineering (Written)

TUESDAY, 14TH OCTOBER 1952
[11 A.M. TO 2 P.M.]

Marks.

1. Plan out a scheme of construction equipment for an earthen dam which is proposed to be executed by the use of mechanical equipment. The following are the important details :— 10

(i) Earthwork 30 M. C. ft.

(ii) Soil-mostly hard to dig.

(iii) Lead up to 2 furlongs one way.

(iv) Dam section comprises of watertight clay and shoulders of previous material.

Give approximate present day prices of the equipment and the cost per unit of earth work.

Marks.

2. What is hardness in domestic water? What are its drawbacks? Name the various known processes by which domestic water can be softened. Where water with nearly Zero hardness is required which process will you recommend. Describe in short its working. 9

3. Sketch fully the dimensioned plan and section of a manhole in which an 18" main sewer running North to South is joined by a 9" branch sewer running East to West. This small branch sewer is given a drop of 4 ft. at the manhole the invert of which is 14 ft. below ground at the site. 9

4. A public convenience on the water carriage system is to be provided to serve 1,000 users daily in an unsewered locality. The soil and subsoil in the area is sandy loam. Explain with sketches the details of the unit which you would propose and describe the working and function of the component parts. 9

5. Write short notes on the following:— 9

(1) Sludge Gas.

(2) B. O. D.

(3) Base-exchange method.

(4) Break point chlorination.

6. Sketch the details of a slow sand filter to deal with 3,00,000 gallons of water per day and explain the inlet and outlet control arrangements. 9

7. A supply of 12,000 gallons per hour is to be drawn from a perennial stream flow, and conveyed to a service reservoir 14,600 feet away through an 8" diameter main. The pipe line passes through undulating country with murum soil, sloping towards a valley for a distance of 6,000 ft. and crosses the valley line at this point and thereafter traverses an uniformly rising ground up to the service reservoir. The following details are available:— 10

R.L. of water at the head works offtake	..	+ 450.
R.L. of the valley crossing	..	+ 380.
Mean water level of service reservoir		+ 632.
Friction loss in the pipe line	..	+ 0·01 per linear yard.

Suggest by a sketch the most economical arrangement for pumping up the supply to the service reservoir, keeping the pressure in the main as low as possible. Show the hydraulic gradient of the main as proposed and indicate the Class or classes of pipes you would use and auxiliaries you would provide enroute.

Marks.

8. Explain why the regulation of flow of water through filters is important ? Sketch one such automatic regulator for its efficient working. Describe the method of washing the rapid gravity filters what should be the duration of the operation. 8

*9. A town is receiving its water supply through two 36" dia. pipes with a fall of 264 ft. in 50 miles. It is proposed to increase the present capacity by 50 per cent. by laying a part length of additional 60" dia. steel main, the old pipe lines and the new main being joined by-cross connections. Find out the exact length of the new pipe line required. What will be the total discharge when the full length of the pipe line is laid ? (Assume $C = 100$ in Chezy formula. $V = C\sqrt{RS}$. 10

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

CENTRAL CIRCLE

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2. What are the various methods of pumping water from a 10" diameter bore rest water level being 30 feet below ground. 9

3. Name the various types of pipes used for laying sewers in a town. Where will you prefer the use of each ? 8

4. A town having a sewerage system and small industry is proposed to be supplied water at the rate of 40 gallons per head. Make out the composition of this rate for the various uses of the community. 9

5. What is a composite dam ? Where will you recommend its use and why ? 8

6. What is a hydraulic gradient and how will you draw it for a pumping main ? 8

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Marks.

7. Give brief information about— 9

(*a*) Sump pump.
(*b*) Submersible pump.
(*c*) Self priming pump.
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8. Give the chemical analysis of a domestic screen sewage from a town having water supply rate of 40 gallons per head per day. What reduction do you expect in B. O. D. and suspended solids after preliminary treatment of sewage. 8

9. Explain the method of manufacture of compost and the principle underlying the same. 8

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

Design and Construction of Earthen Dams (Written)

TUESDAY, 14TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. Draw up detailed specifications for hearting of earthen dam. 8

2. Mention the criteria which are to be satisfied for a good design in respect of an earthen dam. 9

3. Draw a typical cross section (not to scale) adopted in the gorge portion of the Gangapur dam. 8

4. Some earthen dams, in the Deccan have given trouble by slips etc. in the past. Describe what you know about them and the possible reasons of the slips. 8

5. Discuss earth *vs.* masonry dams and state the advantages of the former. 9

6. Describe what hydrological observations, are necessary for the design of the dam, and the steps you would take in making such observations. 8

7. What factor of safety is assumed in the design of earthen dams and why it is lower than that assumed in the case of masonry or concrete structures. 8

Marks.

8. Compare and contract the execution of the work of an earthen dam with machinery and manual labour. 8

9. State why it has been possible recently to build high earth dams with greater degree of security. 9

Total .. 75

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

Design and Construction of Earthen Dams (Oral)

TUESDAY, 14TH OCTOBER 1952

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Marks.

1. What device would you adopt, in an earthen dam to provide against the flood discharge in excess of the estimated one ? 8

2. What is the average hourly output of— 9

(*a*) Tournapull.

(*b*) D-7—scraper.

(*c*) Self tipping trucks, filled in by manual labour. (Assume lead of $\frac{1}{2}$ a mile).

3. What are the working rates for the following in your Division :— 8

(*a*) Uncoursed rubble stone masonry in lime mortar with cement pointing to exposed faces.

(*b*) Pin header pitching 12" thick.

(*c*) Excavation in hard rock and removing the stuff (average lead and lift upto 300 feet and 5 feet respectively).

(*d*) Hearting with soil (lead 1 mile) including consolidation.

4. In what part of the earthen dam would you use silty soils ? 8

5. What are the main conditions under which you would advocate an earthen dam in preference to masonry dam ? 9

6. How much will loose soil excavated from a borrow pit $10' \times 10' \times 1'$ measure ? and what will be its quantity after thorough consolidation ? 8

Marks.

7. Describe the method in brief, how you would control consolidation of bankwork in the field. 8

8. What is Ogee shaped spillway and what are its advantages ? 9

9. Describe the method of laying puddle. 8

Total .. 75

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I AND EXECUTIVE ENGINEERS

Accounts and Rules of the P. W. D. (Written)

WEDNESDAY, 15TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. Explain lump sum contract and state its advantages and disadvantages. 8

2. Give a complete list of documents required to be submitted by the Sub-divisional Officer along with his monthly accounts. 9

3. What steps would you take if you anticipate an excess over the sanctioned estimate 8

(i) at the commencement of the work.

(ii) at a stage when the work is nearing completion.

4. Describe actions which would constitute "Aid to contractors". 8

5. Describe steps to be taken when the contractors' (B-1 or B-2 tender) progress is found to be slow and not commensurate with the time elapsed. 9

6. What precautions should be taken in making out and delivering the cheque ? 8

What should be done when the cheque is (1) time-barred, and (2) lost.

Marks.

7. Explain the following terms :— 6

(*a*) Revised estimate,
(*b*) Reduced estimate,
(*c*) Schedule of rates,
(*d*) Sub-head,
(*e*) Certificate of payment,
(*f*) Completion certificate.

8. What are the present powers of the Chief Engineer, Superintending Engineer and the Executive Engineer in respect of the following :— 8

(*a*) To accept tenders,

(*b*) To sanction repairs to Tools and Plant,

(*c*) To appoint work charged establishment,

(*d*) To write off articles (from the Tools and Plant return) full value of which has been recovered.

9. Mention canons of financial propriety. 10

Total 75

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I AND EXECUTIVE ENGINEERS

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WEDNESDAY, 15TH OCTOBER 1952.

Marks.

1. Define major and minor works. 6

2. Describe steps to be taken if the Karkun or Maistry loses a muster roll during its currency. 9

3. Can the imprest holder use a duplicate receipt book ? 6

4. When does reduced estimate become necessary. 7

5. Can increased rate be paid to the Contractor ? and if yes, to what extent and by whom ? 8

6. What are Sub-Divisional Officer's powers in respect of making payments to the Contractors ? 9

7. What is revised administrative approval and when does it become necessary ? 8

Marks.

8. State powers of the Executive Engineer to pass excess over Sub-heads and excess over estimates. 8

9. What is a supplementary estimate. 6

10. Define secured advance. Can it be given to the piece worker ? 8

Total 75

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

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Water Supply and Sanitary Engineering (Oral)

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[3 P.M. ONWARDS]

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8. What is the Ogee shaped spillway and what are its advantages ? 9

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PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS OF THE B. S. E., CLASS I

GUJERAT CIRCLE, BARODA

General Engineering—Irrigation (Written)

13TH OCTOBER 1952

[2 P.M. TO 5 P.M.]

Marks.

1. Describe briefly the characteristics of a site suitable for a Bandhara. Sketch a typical section of a Bandhara on impermeable foundations, and show the position of the Head Regulator and scouring sluices. 12

2. Design and sketch an R. C. C. "Road Crossing" over a canal 20 feet bed width, with 5 feet of water. 9

3. Give specifications for :— 9

(*a*) Brick-Masonry 2nd Class.

(*b*) Dry-Stone pitching on the Upstream slope of an Earthen Dam.

(*c*) Earth-work in Canal Excavation.

4. (*a*) What is meant by raft foundations ? Where are they used ? 9

(*b*) Where do you use pile foundations ?

(*c*) When and why is grouting of foundations necessary ? How is it done ?

5. What are the seasons of Irrigation, in Deccan and in Gujerat ? Why do they vary ? Do you think any change is necessary in the existing dates ? Mention the crops normally grown on Irrigated water during these seasons. 9

6. What is meant by "Duty of Water". How is it measured ? What is the relation between the various terms of expression of "Duty" ? Give the normal duties of the two most common crops, grown in each season. 9

7. Give a dimensioned sketch of the "Sky-Light" recommended for use in roofs with Country tiles. 9

8. What are the safe loads allowed on 9

(i) Brick-in Cement Mortar.

(ii) Ashlar Masonry.

(iii) Cement Concrete (1 : 2 : 4).

(iv) Brick-in Mud.

Give also the crushing loads for the above.

What is the normal factor of safety adopted.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS OF THE B. S. E., CLASS I

GUJERAT CIRCLE, BARODA

Irrigation and Irrigation Act

OCTOBER 1952

Marks.

1. Write short notes on :— **10**
   (i) Modules.
   (ii) Automatic Level Recorder.
   (iii) Critical Velocity.
   (iv) Wave-Wash.
   (v) Flood absorption.

2. Any earthen bund of a tank (25 feet height) has breached. What are the possible reasons for the failure of the bund ? If you have to fill up the breach, what precautions will you take to see that there are very few chances of the failure recurring at the same place ? **12**

3. Draw and dimension a typical section of a canal in very deep cut (say 40 feet), and of the same canal in bank (say 10 feet). **8**

4. What are the various purposes of gauging a stream ? Where will you fix up your gauging station for the purpose ? How is the discharge measured ? **9**

5. What are the obligations and rights of "Owners" of Water Courses ? **10**

6. Enumerate the offences which are punishable under the Irrigation Act, with a fine of two hundred rupees, or imprisonment of six months. **10**

7. What is the water rate leviable when land intended to be irrigated by Canal Water is irrigated partly by well water, (*a*) if water is carried in separate channels, (*b*) if carried in the same channel ? **8**

8. Certain Irrigation Systems in Gujerat have been recently exempted from the operation of Sections 9, 11 and 12, of the Bombay Canal Rules, 1934. To what do these sections refer, and what is the exemption granted ? Why, do you think, is the exemption granted ? **8**

PROFESSIONAL EXAMINATION OF B. S. E. OFFICERS, CLASS I

Accounts and Rules of the P. W. D. (Written)

14TH OCTOBER 1952

[10-30 A.M. TO 1-30 P.M.]

N.B.—Attempt any *eight* questions of which No. 1 is compulsory.

Marks.

1. What do you understand by "Monthly Account". Enumerate documents by which it is supported. 12

2. "An Executive Engineer has his own financial responsibilities in addition to executive." Support the statement with principal responsibilities. 9

3. P. W. D. (Government) has entrusted the construction of a village road and a building to a Local Board. Describe the procedure an Executive Engineer should adopt for settling the account and payment thereof. 9

4. Descriminate *any six* of the following:— 9

(*a*) Works expenditure and works out-lay.

(*b*) Direct Charges and Indirect Charges.

(*c*) Metal rate and metal return.

(*d*) Running Account and Final Payment.

(*e*) Building Register and Building Return.

(*f*) Land Register and Land Plan.

(*g*) Electric Installation and Electric Charges.

5. What are the Classes of Operations of the P. W. D.? Explain and state under which Class each of the following will fall:— 9

(1) Reconstruction of a Road costing Rs. 8,900 of different metal as an experimental measure.

(2) Reconstruction with a new type of surfacing to meet the present day traffic.

(3) Surface Painting.

(4) Widening of a road involving land acquisition.

5. *Alternative* for Electrical candidate.

What Co-ordination should exist between the Electrical Branch and the Roads and Buildings Branch in respect of preparation of Plans and Estimates and execution of work.

Marks.

6. What do you understand by Deposit Works ? Describe the general out-line of their accounting. 9

7. What is meant by contract and contract work ? Describe kinds of contracts and enumerate contract documents. 9

8. What steps you would take as an Executive Engineer in respect of measurement of works costing over Rs. 20,000 executed by— 9

(i) Contract,

(ii) Daily labour or Piece work.

9. What do you understand by monetary Powers ? Give those of (*a*) Chief Engineer, (*b*) Superintending Engineer and (*c*) Executive Engineer in respect of any *three* of the following :— 9

(*a*) Sanction to Special Tools and Plant.

(*b*) Extra Items.

(*c*) Employment of work charged Establishment.

(*d*) Excess over Estimates for Road, Building and Irrigation Works.

PROFESSIONAL EXAMINATION OF B. S. E. OFFICERS, CLASS I

General Engineering—Electrical Works (Oral)

12TH OCTOBER 1952

[9 A.M. ONWARDS]

Marks.

1. What is the average power factor on the generating Station of an Electric Supply Co. ? When can the power factor on a transmission line be leading ? 13

2. What type of starters are ordinarily provided for induction Motors up to 3 H.P., 20 H.P., and above 20 H.P. ? Why ? 12

3. How can an induction Motor be run as a generator ? When can such running be utilised ? 12

4. What connection is usually preferred for transformers on distribution systems ? 13

Why is Star/Star connection objected to ? Why is Star/Zigzag/connection not objected to ?

5. What are the relative advantages and disadvantages of metal and wooden Poles ? 13

Marks.

6. What is the difference between a static balancer and a rotary balancer ? Where are they used ? 12

7. What are the most likely defects observed in conduit wiring carried out by inexperienced Contractors ? 12

PROFESSIONAL EXAMINATION OF B. S. E. OFFICERS, CLASS I

Electrical Engineering and Indian Electric Act (Oral)

12TH OCTOBER 1952

[9 A.M. ONWARDS]

Marks.

1. What is the licensee's responsibility under the Indian Electricity Act, with regard to the provision of a meter on a consumer's premises ? 13

What determines the accuracy of a meter ?

What steps should be taken on either side if a meter is believed to be incorrect ?

2. What is meant by 'Clear Profit' and 'Reasonable Return' according to Electric Supply Act ? 13

How is the 'Reasonable Return' determined, according to Electric Supply Act ?

3. What is the provision regarding reporting of accidents according to Indian Electricity Act ? 13

Why do accidents take place in installation even though the installation is provided with earthing ?

What steps should be taken to prevent such accidents ?

4. What is meant by split neutral system ? Where is it provided and for what reason ? 12

5. What particulars is a licensee expected to furnish when he submits his Plans for obtaining approval to his method of construction ? 12

6. What is meant by 'Wind Pressure' ? How does it affect a licensee's works ? What is the average Wind Pressure in the State of Bombay. 12

7. What is the difference between a distributing main and a Service lines ? How can a licensee get compensated for laying distributing mains and Service Lines ? 12

PROFESSIONAL EXAMINATON OF B. S. E. OFFICERS, CLASS I

General Engineering—Irrigation (Oral)

12TH OCTOBER 1952

[9 A.M. ONWARDS]

Marks.

1. What is the task for an artesan for one day ? :— 10

Brick Masonry.
Rock-drilling with a Jack-Hammer.
¾ inch Cement Plaster.
Fixing Battens for Mangalore Tiles.
Painting 3 Coats.

2. What time will you allow to elapse before striking shuttering for— 8

Slab.
Sides of Beams.
Bottom of Beams.

3. What is the difference between Ordinary Cement, Rapid-Hardening Cement, and Quick-Setting Cement. Where will you recommend the use of each ? 10

4. How do you measure and pay— 8

Plaster.
Doors and Windows.
Earthwork in Banks.
Rubble.

5. What is the weight of— 10

Brick-Masonry.
Cement Concrete.
Dry-Brick.
Asbestos Roofing as laid.
Steel bar ½ inch diameter.

6. What is a falling Contour ? What is its use ? 5
What is the size of Mangalore Tile. 4

7. What do you understand by— 10

Fetch of Water.
Weep-Holes.
Gable.
Valley Rafter.
Post-Plate.

8. How will you prevent Fraud in measurement in bank work, in places where borrow pits already exist ? 10

PROFESSIONAL EXAMINATION OF OFFICERS OF THE B. S. E., CLASS I

Electrical Energy and Indian Electricity Act

N.B.—All questions to be answered.
All questions carry equal number of marks.

1. Define the following terms according to the Indian Electricity Act :—

(*a*) Electric supply line.

(*b*) Distributing main.

(*c*) Service line.

2. Describe briefly the procedure for obtaining a license under the Indian Electricity Act for supplying energy in any specified area.

3. A owner proposes to erect a new building near a licensee's aerial line which will become accessible during the construction of the building. State what action the owner has to take before starting the actual work.

4. What are the principal points to be considered when scrutinizing a licensee's method of construction for his aerial lines ?

5. (*a*) How is load transferred from one set to another in D.C. sets ?

(*b*) How is the same done in the case of A.C. sets ?

(*c*) Why do the methods differ in the two cases ?

6. Describe briefly the different devices used for protecting aerial lines of different pressures.

7. Write a short note on the " grounded " *versus* " ungrounded " neutral.

8. Discuss the advantages and disadvantages of wood poles and metal poles, with special reference to :—

(*a*) Cost ;

(*b*) Construction ;

(*c*) Location ; and

(*d*) Technical features.

PROFESSIONAL EXAMINATION OF OFFICERS OF THE B. S. E., CLASS I

General Engineering—Electrical Works

13TH OCTOBER 1952

[2 P.M. TO 5 P.M.]

N.B.—Any *seven* questions to be answered.
All questions carry equal number of marks.

1. (*a*) In what respect does a fluorescent light tube differ from an ordinary incandescent or gas filled lamp ?

(*b*) Why is its use considered "harmful", and how can this objection be overcome in practice ?

2. What is your experience of concealed wiring ? What are its advantages and disadvantages compared with other types of wiring ? In what respects does it differ from the standard conduit wiring ?

3. (*a*) Why do some earthing systems fail to prevent accidents ?

(*b*) What, in your opinion, would provide the best earthing arrangement for preventing accidents due to leakage ?

4. (*a*) Describe briefly the protective devices employed in a lift installation for preventing accidents due to breaking of a rope.

(*b*) How is overtravelling prevented in a lift installation ?

5. State the most important points to be attended to in the maintenance of a storage battery. What happens when a storage battery is kept in a discharged condition for a long time ?

6. (*a*) State the factors determining the use of fuseable cut-outs and circuit breakers.

(*b*) What is meant by a circuit breaker with magnetic blow out arrangement and how does it work ?

7. What is the difference between a "squirrel-cage" and a "slipring" motor ? In what respects do their starting equipments differ ?

8. (*a*) What conditions are necessary for the satisfactory parallel operation of power transformers ?

(*b*) What would happen if two transformers having the same voltage ratios, but different impedances, are worked in parallel ?

PROFESSIONAL EXAMINATION OF B. S. E. OFFICERS, CLASS I

Irrigation and Irrigation Act (Oral)

12TH OCTOBER 1952

[9 A.M. ONWARDS]

Marks.

1. What do you understand by— 12

Blocks.
Outlet.
Unit.
Pass.

2. What are the different Cross-Drainage Works required on a Canal. 10

3. What are pre-seasonal and Post-Seasonal Waterings ? When are they necessary ? How are they charged ? 6

4. What is the usual run-off assumed in design of small tanks in Gujarat ? What is the average annual rainfall ? What capacity would you recommend for a Catchment of 10 Square Miles ? 12

5. Describe briefly the procedure adopted when an application for a new watercourse is received by a Canal Officer. 9

6. What do you mean by— 8

Khodwa — Nidwa, Overlap, Day Cusec.

7. What is a Flume ? What is a Standing Wave Flume ? Where are they used ? 9

8. To which Irrigator will you give water first ? Why ? 9

What do you understand by rush Irrigation ? Why is it practised ?

PROFESSIONAL EXAMINATION OF B. S. E. OFFICERS, CLASS I

Accounts and Rules of the Public Works Department (Oral)

12TH OCTOBER 1952

[9 A.M. ONWARDS]

N.B.—*Only* eight *questions to be asked.*

1. What do you understand by Scope of Sanction.

2. What do you understand by recognised system of carrying out work—give answer with brief details.

3. What is Lapsed or confiscated deposits ? What action would you take in respect of each.

4. When is a revised Estimate necessary ? Is there any maintaining limit laid down up to which Revised Estimate is *not* necessary ?

5. What Tools and Plant returns Sub-Divisional Officer has to submit to Divisional Office ? Give brief description of each.

6. What is a revised Estimate and a supplementary Estimate ? Explain difference between them.

7. What is Technical Sanction ? What are the Powers of Technical Sanction of Sub-Divisional Office and Executive Engineer.

8. What are the Powers of hiring of Buildings for Storing materials ?

9. What action you will take if a contractor fails to carry out the work ?

10. What action is taken—

When surplus cash is found in Chest ?

When deficit is found in Chest.

11. What is meant by—

Survey Report.

Suspense Account.

Contractors ledger.

12. What is meant by Contingencies ? What expenditure is Ordinarily incurred on their account.

PROFESSIONAL EXAMINATION OF B. S. E. (II) OFFICERS IN PUBLIC WORKS DEPARTMENT

1952—BARODA CENTRE

General Engineering connected with Roads and Buildings etc. (Written Paper—I)

13TH OCTOBER 1952

[2 P.M. TO 5 P.M.]

N.B.—All questions are compulsory.

Marks.

1. What are the different types of cross drainage works on roads and where will each be suitable ? 8

2. Give specifications for road metal and enumerate all the points to be taken into consideration in selecting such material. 7

3. Give cross sections in embankment and cutting of a Major District Road in goradu soil area from boundary to boundary. Please write all dimensions. 8

4. Write out a set of instructions for an in-experienced subordinate for reconditioning an existing water bound road with a new 2" thick layer of metal. 7

5. Explain briefly the following :— 7

(i) Sight distance.

(ii) Ribbon Development.

(iii) Catch water drain.

(iv) Fanning.

(v) Corrugation.

(vi) Dead-man.

(vii) Water Table.

Marks.

6. Draw a cross section of a Manglore tile roof 30′ span including the truss, with common rafter construction. Name the different members with their sizes. 9

7. Give specifications for I Class Brick-work in super-structure for a high school building. 7

8. (*a*) What points do you consider for selection of a site for a school Building. 8

(*b*) Roughly calculate the cost of the main building for School in a village for 120 Students (Brick masonry walls, Shahabad floor and manglore tiled roof).

9. Briefly explain the following :— 6

(i) Lintel.

(ii) Jack-arch.

(iii) Shingle.

(iv) Skew-Back.

(v) Bed-plate.

(vi) Wall-plate.

10. You are out to inspect the foundation of an important building work. State the points you would inspect closely before allowing foundation concrete to be laid. Write out a set of instructions to your subordinate for laying cement concrete in the foundations proportion 1 : 5 : 10 (Mechanical Mixer is not available). 8

PROFESSIONAL EXAMINATION OF B. S. E. (II) OFFICERS IN PUBLIC WORKS DEPARTMENT

1952—BARODA CENTRE

Roads and Buildings with Special Reference to Modern types etc. (Written Paper—II)

14TH OCTOBER 1952

[2-30 P.M. TO 5-30 P.M.]

N.B.—All questions are compulsory.

Marks.

1. An existing water bound road having 12′ water bound surface in poor condition is to be modernised. The traffic is over 3,000 Tons/24 hours. Prepare an Estimate for one Mile for improving this, with a modern surface for two lanes of traffic. Give a dimensioned cross section of your proposal. Assume the rate prevailing in your district. **13**

2. What are the different methods of constructing asphalt roads? Give short description of each and put them in order of durability. **8**

3. A State Highway crosses a perennial river 300′ wide. The bed strata are approximately as under :— **10**

(i) 0′ to 15′ Sand.

(ii) 15′ to 30′ Fine sand mixed with yellow earth.

(iii) 30′ and below-yellow soil mixed with Kankar in small proportion.

Depth of water at H.F.L. is 20′. What type of bridge would you select for this crossing. Give the size and number of spans, description of foundations, piers and super-structure. Justify your choice and proposals.

4. Explain briefly any *four* of the following :— **8**

(i) Soil-Stabilisation.

(ii) Spill-Channel.

(iii) Indicator Stone.

(iv) Seal-Coat.

(v) Traffic-Lane.

(vi) Hair-pin-Curve.

5. Give specification for earthwork for road embankment in Black-Soil. What type and thickness of soling and surface would you provide for this soil, for an M.D.R. **8**

Marks.

6. In a residential Building the first floor slab is of R.C.C. One room is 14′ × 20′, in the middle of which there is an R.C.C. beam 6″ × 12″. The thickness of R.C.C. slab is 5″. Sketch with dimensions the arrangement of forms for constructing this floor. Height of the room is 12′. 12

7. A six-storeyed building is to be constructed on re-claimed land. Describe briefly the suitable foundations and super-structure for this building. 8

8. What precautions would you take to build a single storeyed brick masonry residential building in black cotton soil area. 8

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS OF THE B. S. E., CLASS II

GUJERAT CIRCLE, BARODA

General Engineering—Irrigation (Written)

OCTOBER 1952

[2 P.M. TO 5 P.M.]

Marks.

1. Describe briefly how you would investigate a Minor Irrigation Tank scheme? What are the financial limits for the scheme to be considered feasible? 12

2. Design and sketch an R. C. C. T-beam and slab for hall 40 feet by 20 feet. (Compression in Concrete not to exceed 650 lbs. sq. inch and Tension in steel not to exceed 16,000 lbs. sq. in. M May be taken as 15.) 9

3. Describe briefly the process of burning Lime. What is the difference between Hydraulic Lime and Fat-Lime? Can fat Lime be made Hydraulic? If so, how? Where would you recommend the use of each? 9

4. Why is pointing done to masonry? What are the different modes of pointing? Which would you recommend? Why? What is the proportion of Cement and Sand recommended for pointing? 9

5. Give the duties of the following crops, in acres per cusec, and in "Delta":— 9

Rice, Bajri, Cotton, Sugar-cane, Tobacco, and Wheat.

Marks.

6. What are rates prevalent in your Division for :— 9
   (i) Brick-pitching in cement mortar 4½" thick.
   (ii) Cement Concrete Coping.
   (iii) Brick-Masonry 2nd class in C. M. (1 : 6).
   (iv) Kharif-Irrigation.
   (v) Single-Watering in Robi.
   (vi) Road-metal 1½" gauge.

7. What is the safe permission load on— 9
   (i) Black-cotton Soil (Pl. sketch a typical foundation on this soil).
   (ii) Compact Sand.
   (iii) Murrum.
   (iv) Compact Gravel.

8. Explain the terms :— 9
   Wing-Wall ; Water-cushion ; Purlin-rafter constitution Catch-water drain ; Newel ; Water-shed.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS OF THE B. S. E., CLASS II

GUJERAT CIRCLE, BARODA

Irrigation and Irrigation Act (Written)

OCTOBER 1952

[A.M. TO]

Marks.

1. Write short notes on :— 10
   (i) Semi-modules.
   (ii) Automatic Gates on Waste-Weirs.
   (iii) Critical Depth for a Standing Wave.
   (iv) Free-board in Canals and Tanks.

2. Draw a dimensioned sketch of the section of an Earthen Dam 25 feet high, founded on clay. Write specification for the various items connected in the work. (Only special points need be mentioned). 12

3. Draw typical sections of a canal carrying 500 cusecs in Deep Cut, Bank and partial bank and Cut. 9

4. During your inspection of the canals you observed silting in certain stretch and scouring in certain stretch of your canal. Draw up your inspection report. What action will you take as an immediate step ? What action do you propose as an ultimate remedy ? 8

Marks.

5. Define a "Water Course". Describe the steps to be taken when you receive an application for the construction of a new water course. 10

6. What are the obligations of irrigators under the Second Class Irrigation Tanks? Who enforces the discharge of these obligations? 10

7. What is a "Panchnama"? When is it prepared? Describe the procedure in brief. 8

8. What rate is charged for:— 8
(i) Area irrigated in excess of sanction.
(ii) Area irrigated without permission.
(iii) When water is allowed to run to waste from a water-course.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJERAT CIRCLE, BARODA

General Engineering connected with Sanitary Engineering, Water Supply, Boring and Use of Machinery (Written)

MONDAY, 13TH OCTOBER 1952

[2 P.M. TO 5 P.M.]

Marks.

1. Define the term 'Sewer'. What material is used for sewers? On what principles will you design the sewers for a City? 10

2. Design a septic tank for the disposal of sewage from a Hostel with an accommodation of 300 students. 10

3. Give specifications for stone ware Pipes, laying and jointing them. How do you test the joints? 10

4. A well is to be constructed for the supply of water to a village having a population of 1,000 souls. What care will you take to see that water in the well remains pure? 9

5. What are the evils of dampness in Buildings? What are its Causes? How will you prevent it? 9

6. How many kinds of boring machines are in use in Gujarat? Which Machine is usually employed for drilling in rock? 9

Marks.

7. A daily supply of 6 M. Gallons is reaching by gravity at the site of a Water-Works proposed to be provided with a rapid gravity filter plant. How many filtering units will you propose for this supply ? What should be the area of each Unit ? What will be the quantity of various Chemicals required for the purification Plant per year ? 9

8. Water is being supplied to a Town by working one 16 B.H.P. Oil Engine for a period of 8 Hours a day by Pumping out water from a well, raising it to an elevated reservoir and distributing it to the Town. There is also a stand-by Engine of the same H.P. Find out the annual maintenance cost for materials and staff only ? 9

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

1952—BARODA CENTRE

Sanitary Engineering (Written)

14TH OCTOBER 1952

[2-30 P.M. TO 5-30 P.M.]

Marks.

1. Prepare a short preliminary note giving financial forecast for a Water-Supply Scheme for a Village Panchayat of 8,000 population in Gujarat. Source of Supply is from an open well with a 6" bore. 10

2. Write short notes on any *four* of the following :— 10

(*a*) Chloronome.
(*b*) Air Valves.
(*c*) Scour Valves.
(*d*) Reflux Valves.
(*e*) Relief Valves.
(*f*) Water Hammer.

3. There can be no malaria where there is no water. But water is essential to life. How will you then try to prevent Malaria ? What precautions will you take for the same in the case of brick-fields ? 10

4. Compare the principles and working of slow sand and rapid gravity filters. In what circumstances will you prefer rapid gravity filters ? 9

5. Describe the Physical properties of good drinking water. What standards are adopted for potable drinking water as regards Chemical Composition ? 9

Marks.

6. Give the various ways of sewage disposal. Sewage from an inland Town having a population of 1,00,000 is to be disposed off after proper treatment. Recommend the method of treatment with reasons. 9

7. What is sludge gas ? Give its analysis. What is the Calorific value ? How much Electrical energy can be generated per day from a sludge digestion plant to which sewage from 2,00,000 people is connected ? 9

8. Describe any *three* of the following with sketches where necessary :— 9

(1) Gulley Trap.
(2) Storm—Water over-flow.
(3) Intercepting sewer trap.
(4) Arrangement of a ventilator for sewers.

PROFESSIONAL EXAMINATION OF B. S. E. OFFICERS, CLASS II

Accounts and Rules of the Public Works Department (Written)

14TH OCTOBER 1952

[10-30 A.M. TO 1-30 P.M.]

N.B.—Attempt any *eight* questions of which No. 1 is compulsory.

Marks.

1. What do you understand by "Works Accounts" ? On what are they primarily based ? What should they invariably specify ? 12

2. A Civil Officer requests for construction of a small water room costing Rs. 900 (nine hundred only) and another requests for provision of a set of two aqua privies costing Rs. 2,500 (two thousand five hundred). Describe the procedure to be adopted for having both the works sanctioned. 9

3. What do you understand by "Cash Transaction" ? In what document their account is kept ? How will you balance and verify such account. 9

4. Descriminate any *six* of the following :— 9

(*a*) Appropriation and Reappropriation.
(*b*) Works expenditure and works out-lay.
(*c*) Sale List and Sale Account.
(*d*) Sectional Officer and Beat Subordinate.
(*e*) Survey Charges and Survey Report.
(*f*) Contract and Contractor.
(*g*) Supervision charges and storage charges.

Marks.

5. What is meant by petty works? Name and describe the P. W. D. terms and forms for carrying them out by an agency other than Departmental. 9

6. Your Sub-Divisional Clerk has lost a Voucher and a Road Karkun in your Sub-Division has lost his completed Muster Roll. Describe the action you will take in both the cases. 9

7. Give a general out-line of the Accounting procedure for Purchases and Stock. 9

8. What do the terms "Periodical and Final Measurements" denote? What measurements can be recorded by a member of a Subordinate Engineering Service in respect of them? What are your responsibilities as a Sub-Divisional Officer in the matter? 9

9. What do you understand by monetary powers? Give those of (1) Executive Engineer and (2) Sub-Divisional Officer in respect of any *three* of the following:—

(1) Local Purchase of Stores.

(2) Payment of Running Account and Final Bill.

(3) Acceptance of tenders in regular forms.

(4) Write off of Tools and Plant for which full value has been recovered.

PROFESSIONAL EXAMINATION OF B. S. E. OFFICERS, CLASS II

Accounts and Rules of the P. W. D. (Oral)

11TH OCTOBER 1952

[11 A.M. ONWARDS]

N.B.—Only *eight* questions to be asked.

1. What is a reduced Estimate? When is it necessary?

2. Is Store-Keeper authorised to record measurements? Quote the limit of Powers if any.

3. What do you understand by Limitation of Sanction, give example.

4. What Stock returns you submit? Give brief descriptions of each.

5. What is meant by Revised Administrative Approval ? When is it necessary ?

6. What do you understand by Heavy Plant and Machinery ? What are the rules for giving on loan to Contractors and Local Bodies.

7. Describe the Cash Balance report when do you submit it with your Sub-Divisional Accounts to the Divisional Office ?

8. What will you do to prove the correctness of the copy of Cash Book you submit.

9. What action you will take for a lost Cheque whose Currency is over.

10. What is Imprest Account ? What is the limit ?

11. Enumerate the forms of Bills and Vouchers in P. W. D.

12. Name the Forms of Tenders. What is difference between them.

PROFESSIONAL EXAMINATION OF OFFICERS IN P. W. D., 1952

BARODA CENTRE

General Engineering connected with Roads and Buildings

(Oral—I)

10TH OCTOBER 1952

[2 P.M. ONWARDS]

Marks.

1. What loads do you consider safe for the following soils for foundations ? :— 9

(i) Black—cotton soil.
(ii) Alluvial—Earth.
(iii) Murum.

2. What are the safe permissible loads on :— 9

(i) Brick-bat Concrete in lime mortar.
(ii) Ordinary country brick masonry in lime mortar.
(iii) Cement Concrete (1 : 2 : 4).

Marks.

3. What task work do you expect for the following items per day by an artisan (*only three*) :— 9

(i) Brick-work II-Class.
(ii) Pointing Brick work.
(iii) Cement plaster $\frac{3}{4}$" thick.
(iv) Shahabad Stone flooring.
(v) Fixing Manglore ridge tiles.

4. How would you measure the following for a Contractor's Payment (*only four*) :— 12

(i) Rubble supply.
(ii) Painting Glazed window.
(iii) Painting wooden venetian window.
(iv) Brick-bats.
(v) Sand.
(vi) Plain-Planked door.

5. What is the approximate weight of the following (*only three*) :— 9

(i) Country teak-wood per C. ft.
(ii) Steam Roller Coal per C. ft.
(iii) Steel per C. ft.
(iv) Corrugated sheet 24 B. W. G. per S. ft.
(v) Road metal per C. ft.

6. What camber would you give for (*only three*) :— 9

(i) Earth road.
(ii) Water bound macadam.
(iii) Asphalt Carpet road.
(iv) Cement Concrete Road.

7. (*Only one*) :— 6

(*a*) How will you measure the hydraulic-gradient at H. F. L. of a large nalla, a day after the flood has subsided.

(*b*) A river is running parellel to an adjoining road for about a Mile length. How would you measure the maximum surface velocity during the high flood.

8. (*Only one*) :— 6

(*a*) What quantities of the following materials are required for a 10-Ton Steam-Roller working for 10 hours per day :—

(i) Coal.
(ii) Engine-Oil.
(iii) Cylinder-Oil.
(iv) Cotton-Waste.

Marks.

(*b*) How much work per day do you expect from the above roller in the following cases :—

(i) Rolling W. B. M. surface 12′ wide and 2″ thick.

(ii) ¾″ Carpet 12′ wide.

9. What points would you particularly consider while inspecting a road before the monsoon. 6

PROFESSIONAL EXAMINATION OF OFFICERS IN P. W. D., 1952

BARODA CENTRE

Roads and Buildings with Special reference to Modern Types Etc. (Oral—II)

10TH OCTOBER 1952

[2 P.M. ONWARDS]

Marks.

1. What should be the height of ground floor rooms for the following types of buildings (*only three*) :— 8

(i) Hospital.

(ii) Inspection Bungalow.

(iii) Quarter for Class III Servant.

(iv) A public Hall for 300 Persons.

2. How much quantities of materials are required for the following (*only three*) :— 9

(i) Bricks for 100 C.ft. of I Class Brick, Masonry.

(ii) Mangalore tiles for 100 S. ft.

(iii) Country tiles for double country tiled roof for 100 S.ft.

(iv) White zinc Paint for painting 3 Coats, 100 S.ft.

(v) Bricks for Brick on edge floor. 100 S.ft.

3. What do you understand by (*only three*) :— 9

(i) Creteways.

(ii) Dowel-bars.

(iii) Graded Aggregate.

(iv) Expansion Joint.

(v) Shock proof curve.

Marks.

4. What quantity of materials you would use for (*only three*) :— 9

(*a*) Asphalt for tack coat on W. B. M. Surface for a $\frac{3}{4}''$ Carpet.

(*b*) Asphalt for semi-grout 2″ thick on a W. B. M. Surface.

(*c*) Aggregate for $\frac{3}{4}''$ thick carpet.

(*d*) Asphalt for 2 Coat heavy surface painting.

5. (*Only one*) :— 7

(*a*) A ten-year old Cement concrete road surface has been badly rutted by heavy bullock cart traffic. What treatment would you suggest for improving the surface. Give quantities for 100 S. ft.

(*b*) An old black top surface has been badly corrugated. What the cheap treatment would you suggest to improve the surface. Give quantities for 100 S.ft.

6. You have to construct a slab drain 3 Nos. 10′ span in a place of a dip across a nalla 5′ deep (*only two*) :— 8

(*a*) What precautions would you take to see that the parapet walls are constructed parallel to the axis of the road ?

(*b*) What kind of Centering for the R. C. C. slab you would use ?

(*c*) What height of parapets above road level would you adopt.

7. (*Only three*) :— 6

(*a*) What size of pits would you excavate for Planting trees along road side ?

(*b*) What would be the spacing of the tree across and along the road ?

(*c*) What kinds of tree guard will you provide near a City ?

(*d*) What precautions would you take to cut the over hanging branch on the road ?

(*e*) Is there any disadvantage to the W. B. M. surface for a road by trees ?

8. What type and thickness of soling and metal crust do you consider suitable for a new State Highway to be modernised with 4″ Cement Concrete slab in :— 6

(i) Black soil area.

(ii) Goradu soil area.

Marks.

9. For what purpose the following machinery is used in road constructions (*only three*) :— 6

(i) Bull dozer.
(ii) Scraper.
(iii) Rotter.
(iv) Grader.
(v) Whibrator.

10. How do you repair a pot hole in (*only two*) :— 6

(*a*) W. B. M. surface.
(*b*) Black top surface.
(*c*) Concrete surface.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJERAT CIRCLE, BARODA

Sanitary Engineering (Oral)

12TH OCTOBER 1952

Marks.

1. (*a*) What is the capacity of a flushing cistern for a water closet ? 10

(*b*) What should be the capacity of a flushing tank at the head of a 6″ sewer ? 10

2. What is meant by self-cleansing velocity ? What gradients you would adopt for the following ? :— 10

(*a*) 7″ S. W. Sewer.
(*b*) 9″ S. W. Sewer.

3. What is (*a*) a shallow well, (*b*) a deep well, (*c*) Artesian well. 10

4. What are water borne diseases ? What precautions would you take to ensure a proper quality of water at all times ? 9

5. How do you make a lead joint under water ? What materials would you use ? 9

6. What will be the approximate cost of the following ? :— 9

(*a*) An R. C. C. Overhead Tank 60′ high and capacity 3 lakh gallons.

(*b*) An Underground R. C. C. Service Reservoir 200′ × 100′ × 12′ deep.

(*c*) An engine room 16′ × 20′.

Marks.

7. What are the current prices of the following ? :— 9

(*a*) Sluice Valve 12″ dia. tested to 400′ head of water.

(*b*) Crude Oil Engine 12 H. P.

(*c*) Centrifugal Pump with a capacity of pumping 10,000 gallons of water against a head of 100′.

8. Compare the following :— 9

(*a*) C. I. Pipes.
(*b*) Hume Steel Pipes.
(*c*) Hume Pipes.
(*d*) Steel Pipes.

What pipes will you use for a distribution system ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT CIRCLE, BARODA

General Engineering connected with Sanitary Engineering, Water Supply, Boring and use of Machinery (Oral)

12TH OCTOBER 1952

Marks.

1. What are the different classes of C. I. Pipes ? What are their test pressures ? For what working pressures will you adopt them ? 10

2. What is the normal dose of the following per million gallons of good filtered water ? :— 10

(*a*) Chlorine Gas.
(*b*) Ammonia Gas.
(*c*) T. C. L. Powder.
(*d*) What is the dose of Alumina per 1 gallon of raw water ?
(*e*) How many grains make 1 lb. ?

3. What are the present rates of the following per 1 cwt. ? :— 10

(*a*) C. I. Pipes S. & S.
(*b*) C. I. Pipes flanged.
(*c*) C. I. Specials standard spigot and socket.
(*d*) C. I. standard flanged specials.
(*e*) Lead for jointing.
(*f*) Spun Yarn.

Marks.

4. What are the prevalent rates of wages for the following ? :— 9

(*a*) Fitter.
(*b*) Mason.
(*c*) Carpenter.
(*d*) Oilman.
(*e*) Cleaner.
(*f*) Blacksmith.
(*g*) Mazdoor.
(*h*) Painter.

5. What are the safe permissible loads on the following per 1 sq. ft. ? :— 9

(*a*) Alluvial Earth.
(*b*) Murum.
(*c*) Rock.
(*d*) Brickbat concrete in lime mortar.
(*e*) Good hard burnt brick in lime mortar.
(*f*) Good bricks in cement mortar.
(*g*) Coursed rubble masonry in cement mortar.
(*h*) Cement concrete 1 : 2 : 4.

6. An Elevated Service Reservoir of 1 lakh gallons capacity is to be constructed with a height of 50′ in R. C. C. What stresses will you assume for the bottom slab for concrete and steel ? Name members of the tank structure which will require calculations for design ? 9

7. State the quantities of materials required for the following :— 9

(*a*) Sand for 100 C. ft. of brick and lime masonry 1 : $1\frac{1}{2}$.
(*b*) Cement for 100 C. ft. of 1 : 2 : 4 cement concrete.
(*c*) Cement for 100 sq. ft. of cement plaster $\frac{1}{2}$″ thick (1 : 3).
(*d*) Lead per 1 joint of 12″ C. I. pipe spigot and socket.
(*e*) Cement for joining 12″ stoneware pipes 100 R. ft. in length.

8. What is the composition of atmospheric air ? What is the standard of purity of air ? What should be the contents of a room in C. ft. per 1 person for a residential building ? 9

PROFESSIONAL EXAMINATION OF OFFICERS IN P. W. D., 1952, CLASS II

BARODA CENTRE

General Engineering—Irrigation (Oral)

10TH OCTOBER 1952

Marks.

1. What is the task-work for an artesan for one day ?:— **10**
   Dry-Stone Masonry.
   Pointing to Brick-Work.
   Mangalore Tile Laying.
   Rock-Excavation.
   White-Washing 3 Coats.

2. How long will you water Cement Concrete ? Why ? **8**

3. What is size of a Standard Brick ? What is its weight ? **8**
Where do you use overburnt Bricks.

4. How do you measure and pay :— **10**
   White washing.
   Doors and Windows.
   Murum.
   Spreading of Road Metal.
   Dry-Stone pitching.

5. What is the legal load for a 3-Ton Lorry ? of— **9**
   Bricks.
   Road Metal.
   Sand.

6. What do you understand by **10**
   Fetch of water.
   Weep-Hole.
   Eaves Board.
   Valley Gutter.
   Dowel-Bar.

7. How will you prevent fraud in measurements in bank work in places where borrow pits already exist. **10**

8. Which do you think gives better Concrete, Gravel Aggregate or Broken Stone aggregate ? **10**

Does the strength of Concrete depend entirely on the aggregates ? If not, on what does it depend ?

PROFESSIONAL EXAMINATION OF OFFICERS IN P. W. D., 1952, CLASS II

BARODA CENTRE

Irrigation and Irrigation Act (Oral)

10TH OCTOBER 1952

Marks.

1. What do you understand by— 12

Blocks.
Outlet.
Units.
Pass.

2. What are the different Cross Drainage Works required on a Canal ? 10

3. How many waterings and of what depth are required for the following ? :— 6

Sugar-Cane. Wheat. Rice.

4. What is the usual run off assumed in the design of small tanks, in Gujarat ? What is the annual rainfall ? What capacity would you recommend for a Catchment of 12 square miles ? 12

5. A Canal is notified under section 5 of the Irrigation Act. What powers have you as a Canal Officer in such case. 9

6. What do you understand by the terms— 8

Pick-up Weir.

Base of Duty.

Acre-Foot : How many acre-feet equal 1 M. cft.

7. What are precautions taken against the failure of an earthen dam by— 9

Wave-Wash. Overtopping. Piping.

8. What is A. I. by D. C. ? How is it related to duty ? 9

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT CIRCLE, BARODA

Sanitary Engineering—Practical Test

10th OCTOBER 1952

[9 A.M. TO 11-15 A.M.]

	Marks.
1. Measure the area of the given figure by a Planimeter.	10
2. Connect the two specified points by fly levels and work out the difference in elevation between these points.	10
3. Explain the permanent and Temporary adjustment of the given level.	10
4. An 18" C. I. main is laid as shown below Pipe B has cracked along its full length. Show how you will remove Pipe B and put the line into commission.	20

A *B* *C*

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT AND SAURASTRA

Practical Test

10TH OCTOBER 1952

[9 A.M. TO 11-15 A.M.]

	Marks.
1. Connect the three specified points by levels, and find out the difference in elevation. (Use the Rise and Fall Method).	10
2. Set out a curve of given radius between the two lines, with a theodolite.	15
3. Find out the area of the given figure by a Planimeter.	7
4. Find out the angle between the two lines *AB* and *BC* using a Prismatic Compass.	8
5. What are the Permanent adjustments of a Dumpy, and *Y* level. How will you carry them out.	10
	50

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS IN B. S. E., CLASS II

CENTRAL CIRCLE

General Engineering Roads and Buildings (Written)

MONDAY, 13TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. (*a*) Detail the different types of cements and their characteristics, and functions and particular uses. 9

(*b*) Note on storage of cement.

(*c*) How will you prepare test cubes of concrete and carry out slump tests.

(*d*) State slumps for —

Cement Concrete roads.

R. C. C. arch.

Beams and columns, heavy.

Beams and columns, slender.

2. (*a*) Draft detailed instructions for an open foundation work for a pier of an arched bridge up to above the bed level. 9

(*b*) How will you deal with a fissure 2′ wide and of great depth containing soft material traversing the foundation in the above case transversely.

3. (*a*) Give the classification of asphaltic products (Bituminous) used for surfacing of roads and their particular uses. 9

(*b*) What are emulsions and cut-backs ?

(*c*) Give constructional details and specifications for a suitable asphaltic treatment for an existing Water Bound macadum carrying a traffic of 1,000—1,500 Tons per day ?

4. (*a*) Discuss briefly the different types of foundations for buildings and bridges stating the circumstances under which each is adopted. 10

(*b*) How will you design a raft foundation for a symmetrical building of small size.

Marks.

5. (*a*) State the tests you would perform on a steel of unidentified manufacture for structural use stating what values you would consider satisfactory. 9

(*b*) What are the latest maximum permissible stresses in structural mild steel and wrought iron.

6. (*a*) What is soil stabilisation ? 9

(*b*) Where it is necessary and how achieved ?

(*c*) What are Liquid limit, plastic limit and plasticity index ?

7. (*a*) State the essentials of a good concrete construction. 10

(*b*) What is water cement ratio ?

(*c*) Describe in general the fineness modulus and how it is used for proportioning aggregates and designing a concrete mix of given strength.

8. (*a*) What are road signs, state their categories giving a few examples of each and the dimensions in rough. 10

(*b*) What other devices are adopted on a road for the safety of traffic ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS IN B. S. E., CLASS II

CENTRAL CIRCLE

General Engineering Roads and Buildings (Oral)

TUESDAY, 14TH OCTOBER 1952

[3 P.M. ONWARDS]

Marks.

1. (*a*) What is a hydrograph, (*b*) How it is made use of, (*c*) What is serious obstruction by floods ? 9

2. (*a*) What are dowel bars. Give their design. Where and why they are used ? 9

(*b*) How you will provide these at expansion joints of a cement concrete road ?

(*c*) How will you provide a 12′ × 4″ R.C.C. Road pavement and provide for traffic during construction.

Marks.

3. (*a*). How will you consolidate a new 6″ water bound Macadam on an existing 12″ Hard Murum Road. 9

(*b*) Is any soling necessary and if so, what type ?

4. (*a*) State the size of guard stones and their functions. 9

(*b*) At a *T* junction where will you provide guard stones ?

(*c*) What road signs are necessary within a furlong from the junction ?

5. Describe the following :— 12

(*a*) Catchwater drain.

(*b*) Road dam.

(*c*) Sheet piling.

(*d*) Falling apron.

6. How will you take measurements of the following for payment :— 9

(*a*) Door and windows.

(*b*) R.C.C. columns, beams and floors.

(*c*) A complicated roofing to a given slope viz. 30°.

(*d*) Plaster work.

7. (*a*) How you will take measurements of reinforcement when steel and concrete are provided for separately in a tender ? 9

(*b*) How much normal lap will you provide (i) for reinforcement in compression member, say a column, (ii) for tension reinforcement of a beam of a building, (iii) for tension reinforcement in a wall of a water Tank ?

(*c*) What are dimensions for hook for reinforcement ?

8. (*a*) How you consolidate concrete and to what extent for R.C.C. members and road slab ? 9

(*b*) What are vibrators and why and where they are used ? What types you know ? and what motive power can be used ?

(*c*) What precautions are to be taken when vibrating R.C.C. work ?

Total 75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS IN B. S. E., CLASS II

CENTRAL CIRCLE

Roads and Buildings with Special Reference to Modern Types of Road Constructions (Written)

MONDAY, 13TH OCTOBER 1952

[3 P.M. TO 6 P.M.]

Marks.

1. A drain for a catchment area of 20 acres is to be provided in a Ghat road (State Highway) partly in cutting and partly in bank about 5 feet high at end of formation with a retaining wall. The storm water is brought by side gutter and a nalla. Design the drain and retaining wall and sketch a section showing the road and the drain at the spot. 9

2. An R.C.C. framed structure is to be provided for a block of 3 garages with an Office on top :— 12

(*a*) Give sketches to your Overseer for drawing plans of ground and first floor and a section.

(*b*) Draw an R.C.C. key plan at first floor level and name the members to commence detailed design.

(*c*) At what rates will you roughly estimate such a structure ?

3. A steel roof truss of more than 80 feet span rests on a steel stanchion at one end and on masonry wall 2 feet thick at the other end. The reactions are 20 tons each. 9

Sketch neatly the details and connections at the 2 supports. Load on masonry not to exceed 4 tons/square foot. Furnish designs where necessary.

4. A simply supported wooden beam 10″ × 16″ size and 20′ effective span carrying a uniformly distributed load of 24,000 lbs. shows signs of excessive deflection. 9

Design strengthening of it by addition of steel plates (safe stress in wood—1,200 lbs./square inch, compression and tension. Modular ratio for steel and wood—20).

How you will fasten the plates to the beam. Give sketches. How will you carry out the work of strengthening ?

5. What are National and State Highways ? Name a few you know. Give standards for (1) land width, (2) formation, (3) curves, (4) gradient and (5) wearing surface. 9

Marks.

6. In a multi-storied building on a ground floor a wall 2′ thick and 30′ long between cross walls and 15′ high to ceiling is to be entirely removed to a height of 10′ clear from floor to provide intercommunication with the adjacent room. 9

Discuss by sketches how you would tackle the problem ensuring perfect safety during construction. A column midway is permitted.

7. You are projecting a new road connecting a town with a main road 10 miles away. Discuss the essentials for a good alignment and construction you will bear in mind. Assume any terrain you may have in view, but with a major drainage channel intervening. 9

What is your estimate of such a road to M. D. R. standard with heavy traffic ?

8. An R.C.C. cantilever canopy is to project artistically 12 feet from a main entrance 20 feet wide. Sketch neatly detailed section through it giving your best judged reinforcement and dimensions. How you will balance this load ? 9

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS IN B. S. E., CLASS II

CENTRAL CIRCLE

Roads and Buildings with Special Reference to Modern Types of Roads Construction (Oral.)

WEDNESDAY, 15TH OCTOBER 1952

[12 NOON ONWARDS]

Marks.

1. (*a*) What maintenance precautions you will bear in mind for— 6

(i) Steel bridges.
(ii) Road berms.
(iii) A thin pre-mixed carpet.

(*b*) How will you carry out patch repairs in asphalt surface. 4

2. (*a*) How you retard setting of a Hot application asphalt and where it is necessary ? What proportion ? 3

(*b*) To what temperatures you will heat asphalt 30/40 and what quantities are needed for— 6

(i) Premix carpet 2″.
(ii) Full grouting 2″.

3. (*a*) What essential points you will look to in a C. R. Masonry in cement mortar for a bridge pier. 5

(*b*) What points will you insist for a proper pointing. 3

Marks.

4. Describe the following, giving values, where necessary— 9

(*a*) Control line.
(*b*) Building line.
(*c*) Ribbon development.

5. (*a*) Why bearings are necessary for long span bridges ? What limit ? 9

(*b*) What are the different types and their functions ?

(*c*) What maintenance precautions are necessary ?

6. A small R.C.C. framed-sub-structure for a reservoir is to be built on a made up ground of considerable depth of 20 years standing. What types of foundation you would provide and what constructional precautions you will take. 9

7. State the quantities for— 12

(i) Cement for 100 c. ft. net of 1 : 2 : 4 concrete.

(ii) Cement mortar per 100 c. ft. stone masonry for watertight work.

(iii) Cement mortar per 100 c. ft. stone masonry for bridge pier.

(iv) Reinforcement in columns and beams.

(v) Asphalt for seal coat.

(vi) Dry density of an embankment consolidated satisfactorily.

8. (*a*) An existing metalled road is to be upgraded and modernised. State what points you will take into consideration and provide for in your modernising estimate. 5

(*b*) What is the present cost per mile of following surfaces :— 4

(i) Cement concrete road surface 1 : 2 : 4, 12′ × 4″.

(ii) $\frac{3}{4}$″ pre-mix carpet with and without seal coat.

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

General Engineering connected with Irrigation (Written)

MONDAY, 13TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. What are the main differences between fat lime, Hydraulic lime and cement ? If Kankar is not available, give methods of rendering fat lime hydraulic. 10

Marks.

2. Show with sketches the best design of a compound gate for an Irrigation Inspection Bungalow. **10**

3. Give the present day rates of the following items in your Division and give detailed analysis of any one of them :— **10**

(*a*) Uncoursed rubble masonry in lime mortar cement pointed to exposed faces.
(*b*) Cement concrete (1 : 5 : 10) in foundation.
(*c*) Window first class fully glazed.
(*d*) Mangalore tiled roofing including battons.
(*e*) Cement plaster $\frac{3}{4}$" thick.
(*f*) B. B. in lime masonry II class with cement pointing to exposed faces.

4. Write down specifications for earth work in high bank of a canal. **8**

5. Describe types of pointing to masonry and which you consider the best ? **9**

6. Describe methods employed to fill in foundations of a canal regulator, where (i) Strong sub-soil flow is encountered and where (ii) spring is met with in addition to sub-soil flow. **10**

7. (*a*) What points you would look for in selecting a site for a bandhara. **10**

(*b*) Show with sketches the best arrangement for taking off the channel from a bandhara.

8. Explain the following terms, with sketches where necessary :— **8**

(*a*) Aqueduct.
(*b*) Superpassage.
(*c*) Waste weir.
(*d*) Afflux.
(*e*) Fluming.
(*f*) Kutter's coefficient.
(*g*) Escape.

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

General Engineering connected with Irrigation (Oral)

TUESDAY, 14TH OCTOBER 1952

[3 P.M. ONWARDS] .

Marks.

1. A masonry bandhara is leaking. What method you would adopt to stop the leakages. **10**

Marks.

2. How much allowance you would make for losses in transit from the distributory head to the head works of a canal. 10

3. Give the quantities of the following materials which can be conveyed in a bullock cart :— 8

(*a*) Burnt bricks.
(*b*) Sand.
(*c*) Mangalore tiles.
(*d*) Stone metal.

4. What dry and wet density you would specify for embankment of a canal ? 10

5. What precautions you would take to prevent blowing off of asbestos sheets of roof by high winds ? 9

6. What steps are taken to eliminate weed trouble in the canals ? 10

7. Mention the area of water way under an irrigation channel to drain off a catchment area of 80 acres. 9

8. What procedure is followed if you require private land urgently for your work ? 9

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

Irrigation and Irrigation Act (Written)

MONDAY, 13TH OCTOBER 1952

[3 P.M. TO 6 P.M.]

Marks.

1. Describe the steps which you would take if you find that the owner or owners of a Watercourse fail to maintain their Watercourse in proper order. 9

2. What is the provision in the Irrigation Act of 1879 for obtaining labour for canal works in emergencies ? 8

3. What does the term 'Canal' include according to the Irrigation Act of 1879. 8

Marks.

4. You have 10,000 Mcft of water available in the reservoir on the 15th October. The reservoir is situated about 60 miles above the Pick-Up Weir of the canal system. Assume river gains of 1,000 Mc. ft. in Rabi Season and prepare a Preliminary Irrigation Programme for the Rabi Season to irrigate the following crops :— 10

(i) Basic Sugarcane in Blocks .. 2,500 Acres.
(ii) Basic Sugarcane on form VII on volumetric basis .. 8,000 ,,
(iii) Bhusar crops on form VII .. 6,000 ,,
(iv) Other perennials .. 1,200 ,,
(v) Bhusar crops in two seasonal Blocks measuring 300 acres in Area.

(Usual overlap of cane allowed in Rabi Season should be provided for).

5. Describe the steps which you would take if a breach occurs in the length of the canal in high embankment. 9

6. What is meant by Betterment Levy and Irrigation cess and the purpose for which these are levied ? 8

7. Mention the points on which you would submit information if you are asked to prepare preliminary report of a minor Irrigation Tank. 9

8. (*a*) What is a Panchanama ? 9

(*b*) What are the actions for which it is held ?

(*c*) Describe the process of the Panchanama from its preparation to final sanction.

9. Define :— 6

(*a*) Semi-module.
(*b*) Base.
(*c*) Capacity factor.
(*d*) Intensity of Irrigation.
(*e*) Long term Adsali.
(*f*) Nidwa.

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

Irrigation and Irrigation Act (Oral)

WEDNESDAY, 15TH OCTOBER 1952

[2 P.M. ONWARDS]

Marks.

1. What is a water course as defined in the Irrigation Act, 1879 ? 9

Marks.

2. State the number of waterings required for the following crops :— 8

(*a*) Sugarcane.
(*b*) Jowar.
(*c*) Wheat.
(*d*) Rice.

3. What is supply on volumetric basis and why it is preferable to supply on area basis ? 10

4. What is overlap and what is average overlap generally allowed in monsoon, Rabi and Hot weather seasons ? 10

5. What type of device would you use if you want to ensure that the discharge of the water course is proportional to water level in the parent channel ? 10

6. What do you mean by— 9

(*a*) AI DC.
(*b*) Duty on cane basis.
(*c*) Protected tenant.
(*d*) Delta.
(*e*) Rotation.
(*f*) Module.

7. Quote the formulæ of discharge through S. W. F. What are the essential conditions to ensure that the flume measures the discharge correctly ? 10

8. How would you distinguish between leakage and percolation water from the canal bund ? 9

Total .. 75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

General Engineering connected with Water Supply and Sanitary Engineering.

MONDAY, 13TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. Explain briefly any *three* of the following :— 9

(*a*) Artesian well.
(*b*) Infiltration gallery.
(*c*) Yield and recuperation power of a well.
(*d*) Maximum flood discharge from a catchment.

Marks.

2. A town obtains its water supply from an impounding reservoir having an earthen dam of 54 ft. in height. Explain clearly with sketches the following :— 10

(*a*) Arrangement of foundation so as to make them safe against percolation and against slipping of the dam.

(*b*) Arrangement of materials in the work of the dam.

3. What is meant by coagulation of water ? Write short notes on the chemicals used for the purpose and describe various methods adopted for securing economical and efficient coagulation. 9

4. Why is disinfection of public water supply considered necessary even when filtration is provided ? State various materials used in this disinfection. 9

5. The town of Malegaon has constantly recurring epidemics of Cholera and Typhoid. Various schemes are suggested to permanently stop these deseases. State which particular scheme you would give preference and guarantee the removal of the epidemics. Describe your scheme in short detail. 10

6. Write short notes on any *three* of the following :— 9

(*a*) Standard to be followed for permissible impurities in a potable water supply.

(*b*) pH value.

(*c*) B. O. D.

(*d*) Algae control in water supply.

(*e*) Hydraulic ram.

7. Write out a detailed short specification for construction of a four seated aqua privy block in a District Judges Court compound. 9

8. Write out an M. & R. estimate for supply of water to a town with following data :— 10

Water is obtained from river infiltration works. Water is pumped by deep well turbine pumps run by electrical motor against a head of 110 ft. Current is available at one anna per unit. Daily supply is 0·8 million gallons pumped in 8 hours in the R. C. elevated town reservoir. Management of distribution system is not under your control.

9. Sketch and explain the uses of— 9

(1) Sewer traps.

(2) Cowl-ventilator for water supply.

(3) Ventilator for sewerage system.

(4) Surface drains.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

General Engineering connected with Water Supply and Sanitary Engineering (Oral)

TUESDAY, 14TH OCTOBER 1952

Marks.

1. What are the present day rates of— 8
   (*a*) Chlorine gas per lb.
   (*b*) 9" diameter spun C. I. pipes per ft.
   (*c*) Coursed rubble masonry in cement mortar 1 : 4.

2. What is the difference between chloramine treatment of water and pre-chlorination of water ? 9

3. What timber will you use for— 8
   (*a*) Furniture in Raj Bhuvan.
   (*b*) Packing cases for despatching an Oil Engine.
   (*c*) Dance floor at a first class Club.

4. What load will you allow for foundation of columns for an elevated reservoir in— 8
   (*a*) Soil.
   (*b*) Murum.
   (*c*) Hard rock.

5. How many 9" diameter vertically cast C. I. pipe each 12' long can you carry in a three ton truck ? 9
   How many Cft. of coal will go in the above truck ?

6. What are the average daily wages in your district of— 8
   (*a*) Female coolie.
   (*b*) A pipe jointer.
   (*c*) An Oil Engine Driver.
   (*d*) A blacksmith.

7. Quote rates for labour prevailent in your district for— 9
   (*a*) Excavation in wet soil for foundation 10' deep lead 100 feet.
   (*b*) Brick masonry first sort in cement mortar 1 : 4 proportion.
   (*c*) Laying and jointing 12" diameter stoneware sewer.

Marks.

8. What are the calorific values of— 8

(*a*) Coal of average quality.
(*b*) Light diesel oil.
(*c*) Sludge gas.

9. Under what circumstances would you recommend— 8

(*a*) Bullock cart and

(*b*) Motor lorries as a medium of transport of dry refuge of a town. State the various advantages of a bullock cart fitted with pneumatic outfit over an ordinary iron tyred one.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

Water Supply and Sanitary Engineering

MONDAY, 13TH OCTOBER 1952

[3 P.M. TO 6 P.M.]

N.B.—Answer any *eight* questions.

Marks.

1. An Inz-type R.C. elevated reservoir of 2 lakh gallons capacity is to be constructed in two compartments. Draw in plan and section the arrangement of inlet, outlet wash out and overflow pipes, giving sizes of each and showing all required fittings. 10

2. What is activated sludge process in sewage purification. Describe this in detail, with sketches. Under what circumstances will you recommend this treatment for a district town in Bombay State. 10

3. Write short notes with sketches on any *four* of the following :— 9

(*a*) Chlorinator, (*b*) Contact bed, (*c*) Pneumatic collection of sewage, (*d*) Valve tower, (*e*) Isohyetal chart of rainfall in India.

4. Propose a suitable scheme for village sanitation in respect of its conservancy and prevention from malaria and other water-borne diseases. 9

An approximate cost of the proposed works for a village of 500 people should also be indicated in an estimate form.

Marks.

5. Sketch fully the dimensioned plan and section of a double chambered septic tank and trickling filter for treatment of sewage from a hospital of 100 beds. 9

6. It is proposed to supply water to a city block containing 8,000 people from a tube well of 8″ diameter through a 9″ rising main via 40 feet R. C. water tower. 10

Calculate the B.H.P. of oil engine for 8 hours daily pumping and based on the following data :—

City is provided with sewers.

Length of rising main = 5,000 ft. rest water level in the tube well = 20 feet below G.L.; depression of water level while pumping the required discharge = 25 feet; maximum water level in the water tower = 40 feet above ground; frictional loss in the rising main = 0·024 per yard. Efficiency of pumps and oil engine 85 per cent. and 60 per cent. respectively.

7. State the Hazen and Williams formula for discharge of water through pipes. 9

Two reservoirs are connected by a 12″ diameter straight hume pipe line 10,500 feet long. If the difference in water level in the two reservoirs be 105 feet find the discharge through the pipe line in gallons per minute.

8. Write a detailed note on sludge digestion dealing fully with the chemical as well as engineering aspect of the problem. 9

9. An infiltration well 25 feet in diameter 15 feet below bed of river is to be sunk in the river Orsang at Dabhoi. Give a dimensioned sketch of the R. C. curb you will required for this well. Work out an estimate for sinking such a well.

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

General Engineering connected with the Design and Construction of Earthen Dams (Written)

MONDAY, 13TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. What are the main differences between fat lime, hydraulic lime and Kankar? If Kankar is not available give methods of rendering fat lime hydraulic. 12

Marks.

2. Show with sketches the best design for a compound gate of an Inspection Bungalow. 8

3. Name different types of earthmoving machinery and describe in detail the working of one of them. 10

4. State different types of lime kilns describing one of them with sketches. 10

5. What precautions are necessary to prevent accidents from blasting operations ? 10

6. Give safe permissible loads on following types of soils :— 6

(*a*) Wet and marshy clay.
(*b*) Black cotton soil.
(*c*) Compact sand.
(*d*) Murum.
(*e*) Red earth.
(*f*) Compact clay (nearly dry).

7. (*a*) What is water cement ratio and how does it affect the strength of cement concrete ? 9

(*b*) What are three grades of concrete ?

(*c*) How will you obtain the densest concrete ?

8. State the possible reasons of failure of earthen dams and precautions to be taken to prevent them. 10

Total 75

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

General Engineering connected with the Design and Construction of Earthen Dams (Oral)

TUESDAY, 14TH OCTOBER 1952

[3 P.M. ONWARDS]

Marks.

1. Give the quantities of the following materials which can be conveyed in a bullock cart :— 8

(*a*) Burnt bricks.
(*b*) Khandkies.
(*c*) Mangalore tiles.
(*d*) Sand.

2. What precautions you would take to prevent blowing off of asbestos sheets of roofs ? 9

Marks.

3. What procedure is followed if you require private land urgently for your work ? 10

4. What allowance would you make for evaporation losses in the lake, while designing a dam ? 10

5. Mention the area of waterway which you would provide under an irrigation channel for draining off a catchment area of 80 acres. 9

6. What are different zones in the section of an earthen dam ? 10

7. What slump is permissible for mass concrete in foundation ? 10

8. What is berm and in what position it is provided ? 9

Total .. 75

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

Design and Construction of Earthen Dams (Written)

MONDAY, 13TH OCTOBER 1952

[2 P.M. TO 4 P.M.]

Marks.

1. You are placed in charge of constructing an earthen dam costing Rs. 12 lacs (to be carried out departmentally). Describe the set up of the organization to supervise and carry out the work and list the machinery you would need for the job. 12

2. Draw (not to scale) a general layout of the drains of the earthen dam and describe their function. 9

3. Give rates for the following items in your Division giving analysis of item (*b*) :— 8

(*a*) Cement concrete (1 : 2 : 4).

(*b*) Coursed rubble stone masonry II sort in lime mortar cement pointed.

(*c*) Cement concrete, block in course masonry for arch rings.

(*d*) Supplying khandkies lead 2 miles.

Marks.

4. Draw a typical dimensioned cross section of an orthodox type earthen dam 40 feet in height. **9**

5. Mention the various tests to which soils are subjected for considering their suitability or otherwise for earth dams and describe one of them in detail. **10**

6. State reasons for preferring power road roller to bullock roller for consolidation of earthen dams. **9**

7. A dam is proposed to be constructed at a point, about 30 miles to the east of the western ghats. The catchment area is 150 sq. miles. Calculate flood discharges by different formulæ and state which of them you would adopt for designing the waste weir and why ? **10**

8. State why it has been possible recently to build high earth dams with greater degree of security ? **8**

Total .. **75**

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

Design and Construction of Earthen Dams (Oral)

WEDNESDAY, 15TH OCTOBER 1952

[2 P.M. ONWARDS]

Marks.

1. Will you put in concrete in foundation on hard rock bed before starting to build masonry ? **8**

2. What method would you adopt in making the rubble pitching on the face of dam as water tight as possible ? **9**

3. What precautions are taken in designing an outlet through an earthen dam ? **10**

4. What is the average hourly output of a TOURNAPULL with capacity of 12 cub yards (struck) and 15 cub yards (Heaped) assuming lead of half a mile ? **10**

5. What is the importance of Hydrology in the design of dams ? **10**

6. What are syphon spillways and where they are advocated ? **10**

Marks.

7. Where will you use concrete Trench instead of puddle trench ? 9

8. What is grouting and under what conditions it is specified ? 9

Total .. 75

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

General Engineering connected with Lift Irrigation (Written)

MONDAY, 13TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. What are the main differences between fat lime, hydraulic lime and cement ? If Kankar is not available, give methods of rendering fat lime hydraulic. 10

2. Show with sketches the best design of a compound gate for an Inspection Bungalow. 10

3. Give the present day rates of the following items in your Division and give detailed analysis of one of them :— 10

(*a*) Uncoursed rubble masonry in lime mortar, cement pointed to exposed faces.

(*b*) Cement concrete (1 : 5 : 10) in foundation.

(*c*) Providing and laying 18″ diameter 'B' Class Hume pipe rising main, including joints etc. complete.

(*d*) Cement plaster 3/4″ thick with neeru finish.

(*e*) B. B. and lime masonry II sort, with cement pointing to exposed faces.

(*f*) Country cut teak wood work including oiling two coats.

4. Explain the following terms with sketches where necessary :— 8

(*a*) Aqueduct.
(*b*) Superpassage.
(*c*) Waste weir.
(*d*) Afflux.
(*e*) Fluming.
(*f*) Kutter's Coefficient.
(*g*) Escape.

Marks.

5. Describe types of pointing to the masonry and which of them you consider the best. **9**

6. Draw up specification in brief for excavating the irrigation channel including necessary bank work. **12**

7. Draw a dimensioned sketch of an engine house for fixing 3 engines each of 30 H. P. **10**

8. Give safe permissible loads on the following types of soils :— **6**

(*a*) Wet and marshy clay.
(*b*) Black Cotton soil.
(*c*) Compact sand.
(*d*) Murum.
(*e*) Red earth.
(*f*) Compact clay (nearly dry).

Total .. **75**

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

Construction and maintenance of Lift Irrigation Schemes (Written)

MONDAY, 13TH OCTOBER 1952

[3 P.M. TO 6 P.M.]

Marks.

1. Mention points in respect of which data for the Civil Engineering part of the Lift Irrigation Scheme is to be collected at the time of preliminary investigation. **10**

2. What are the special features to be looked for while selecting a site for an economical Lift Irrigation Scheme ? **9**

3. What is Multi-stage pumping and when it becomes necessary to adopt it ? **6**

4. Draw a dimensioned sketches (i.e. plan and section) showing the intake chamber of the Lift Irrigation Scheme. **10**

5. What are different classes of Hume Pipes and for what pressure each of them is used ? **7**

6. Calculate Horse Power of the Engine required to pump water through the gross head of 60 feet (including head due to friction) for irrigating an area of 400 acres, with 16 hours working of the pumps (Assume permissible crop pattern). **12**

Marks.

7. Describe in brief one of the Lift Irrigation Scheme in your charge and the advantages, beneficiaries are deriving from the same. 12

8. (*a*) What is a balanced section of the irrigation channel ? 9

(*b*) What is critical velocity of a channel ?

(*c*) What bed gradient you would adopt for an irrigation channel carrying 5 cusecs discharge ?

75

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

General Engineering connected with Land Drainage (Written)

MONDAY, 13TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. What are the main differences between fat lime, Hydraulic lime and cement ? If kankar is not available, give methods of rendering fat lime hydraulic. 10

2. Show with sketches the best design of a compound gate for an inspection bungalow. 10

3. Give the present day rates of the following items in your Division and give detailed analysis of any one of them :— 10

(*a*) Uncoursed rubble masonry in lime mortar, cement pointed to exposed faces.

(*b*) Cement concrete (1 : 5 : 10) in foundation.

(*c*) Providing and laying Hume Pipes 18″ in diameter, including collars and joints.

(*d*) Cement plaster $\frac{3}{4}$″ thick with neeru finish.

(*e*) B. B. in lime masonry II class with cement pointing to exposed faces.

(*f*) $1\frac{1}{2}$″ thick cement concrete (1 : 2 : 4) pavement over $4\frac{1}{2}$″ cement concrete (1 : 5 : 10).

Marks.

4. Explain the following terms with sketches where necessary :— 8

(*a*) Aqueduct.
(*b*) Superpassage.
(*c*) Waste weir.
(*d*) Afflux.
(*e*) Fluming.
(*f*) Kutter's Coefficient.
(*g*) Escape.

5. Describe types of pointing to masonry and which of them you consider the best. 9

6. Draw dimensional sketches showing type plan section of a manhole for pipe lines for Land Drainage. 10

7. Make a list of drawings required for a complete drainage Project. 9

8. Draw a typical section showing relative positions of soils and substrata in the Deccan Canal Tracts, illustrating how the damage occurs due to canal. 9

Total .. 75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

General Engineering connected with Land Drainage (Oral)

TUESDAY, 14TH OCTOBER 1952

[3 P.M. ONWARDS]

Marks.

1. Give the quantities of the following materials which can be conveyed in a bullock cart :— 8

(*a*) Burnt Bricks.
(*b*) Sand.
(*c*) Mangalore tiles.
(*d*) Stone metal.

2. What precautions you would take to prevent blowing off of asbestos sheets of roof by high winds. 9

3. What is Bulrush and what steps are taken to eradicate the same. 10

4. What procedure is followed if you require private land urgently for your work. 9

Marks.

5. Compare and contrast Machinery versus Manual labour for excavating drains. 9

6. Describe Tarwad revetting and when is it used. 10

7. What is the waterway which you would provide in the cross drainage work, for draining off the catchment area of 60 acres ? 10

8. Classification of soil and damage has to be made. How many acres can an auger measurer or a karkun classify completely, on an average per day. 10

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

Land Drainage (Written)

MONDAY, 13TH OCTOBER 1952

[2 P.M. TO 4 P.M.]

Marks.

1. Describe the effect of drains on the sub-soil Water Table. 8

2. Mention survey data which should be collected for preparing a drainage scheme. 9

3. Describe use of augers for sub-soil surveys. 8

4. Mention the factors on which the amount of damage caused by heavy irrigation depends. 8

5. A canal of medium size is running through high bank and causing considerable damage to the adjoining lands. 10

Describe methods both short and long term, to arrest and prevent the damage.

6. Draw up a sample inspection note of the existing drainage system. 7

7. Write down specifications for an open trench drain. 8

8. What are the conditions which make the deep sub-soil drains necessary. 8

9. Outline, in brief, the procedure for acquiring land for drains under ordinary clause. 9

Total .. 75

PROFESSIONAL EXAMINATION OF B. S. E., CLASS II

Land Drainage (Oral)

WEDNESDAY, 15TH OCTOBER 1952

[2 P.M. ONWARDS]

	Marks.
1. Mention factors which affect sub-soil water table in the Deccan Canal area.	10
2. What is meant by M. I. B. and H. I. B.	9
3. Describe circumstances in which sub-artesian bores are constructed in the bed of the drain.	10
4. What are the positions where deep and shallow drains are provided ?	9
5. Why is the gradient of open trench kept uniform as far as possible ?	9
6. What are the factors which decide whether open trench or pipe line should be adopted ?	11
7. Name masonry works which are required to be constructed in the Drainage Scheme.	9
8. What is " Cut up " land ?	8.
	75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

General Engineering connected with the use of machinery (Written)

MONDAY, 13TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

	Marks.
1. State the various ways in which power can be transmitted from a prime-mover to a driven machine.	10

How are the following generally driven—

(*a*) A compressor by an oil engine.
(*b*) A steam road roller.
(*c*) A Sheep's foot roller.
(*d*) A Concrete mixer.

Marks.

2. A 10″ high lift deep-well turbine pumping set driven by a 78 B.H.P. horizontal crude-oil engine is installed on a 15′ diameter 60′ deep well. Water level in well is 30′ from the top. Sketch arrangement for installing the set showing foundation for engine and other details. 10

3. Describe how a 30″ diameter right-angle bend one end socketted and other end flanged is cast in a foundry. Describe the various operations for completion of this bend till it is despatched. 9

4. Write short notes on— 9

(1) Gears in a motor car.
(2) Boiler testing pump.
(3) Starting of oil engines.

5. Four bores are proposed to be taken for ascertaining the foundation strata for a bridge across a tidal creek. A rottary boring machine is sent on the site. Describe the process by which you will complete the boring operations. 9

6. Compare road rollers run on steam and oil. State their advantages and disadvantages. What type would you recommend for use in Karwar, Ahmedabad and Poona districts. Give reasons for your answer. 10

7. You are asked to select ten 5-tons motor trucks for work in Dharwar district. Which will you prefer ? Petrol driven or oil driven. Give reasons for your choice. Write out an indent with specifications for ordering out these vehicles. Your indent should include details of the usual spares required for 3 years running. 9

8. In an internal combustion engine what are the reasons of— 9

(*a*) Carbon deposits in a cylinder.
(*b*) Knocking takes place.
(*c*) Machine refuses to take load.

How will you rectify these.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

Accounts and Rules of the P. W. D. (Written)

TUESDAY, 14TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. Describe different parts of Muster Rolls and draw up a specimen of Part I, making few sample entries. 13

Marks.

2. What are different forms of Contracts and when each of them is used ? 9

3. Explain any *six* of the following terms :— 6

(i) Secured advance.
(ii) Write back order.
(iii) T. E. O.
(iv) Completion report.
(v) Completion certificate.
(vi) Revised estimate.
(vii) Workslip.
(viii) Schedule of rates.
(ix) Register of Works.

4. Write a sample page of the Sub-Divisional cash book, making the following entries :— 12

(i) Opening balance—Rs. 105-6-0.

(ii) Cheque drawn for replenishment of cash and cashed —Rs. 1,000.

(iii) Payment of M. R. of Rs. 320-4-0.

(iv) Advance of imprest to Shri Patil, Overseer— Rs. 75.

(v) Refund of deposit to Shri Kulkarni, Contractor— Rs. 210.

(vi) Receipt of Rs. 55 (in cash) on account of sale proceeds of grass in the compound of the Office.

(vii) Amount of Rs. 500 taken out from Chest by the S. D. O. for making payment out of head-quarters.

(viii) Payment of M. R. amounting to Rs. 480-11-0 and returning the balance of Rs. 19-5-0 to the Chest.

(ix) Recouping imprest of the Store-Clerk for an amount of Rs. 32 (Expenditure to be shown debited to 3 works). Close Cash Book, strike balance and give certificate of verification of cash balance.

5. What conditions must be fulfilled before a work can be started. 8

6. Define secured advance. In what circumstances such advances are permissible ? On what articles its grant is prohibited ? 8

7. How do you control expenditure on works and what steps you would take if you anticipate an excess over an estimate. 9

Marks.

8. Define administrative approval and technical sanction. What are the present powers of the Executive Engineer in respect of administrative approval and technical sanction for works pertaining to (i) Roads and Buildings and (ii) Irrigation. 10

Total .. 75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS.

Accounts and Rules of P. W. D. (Oral)

THURSDAY, 16TH OCTOBER 1952

Marks.

1. What is the procedure if (*a*) the currency of the cheque expires and (*b*) cheque is lost. 7

2. What is Transfer Entry Order and when it is necessary ? 8

3. State the minimum amount for which a cheque can be drawn ? 7

4. State the maximum amount up to which Sub-Divisional Officer can make cash payment. 7

5. What is reduced estimate and when does it become necessary ? 8

6. What are the powers of the Executive Engineers and Deputy Engineers about acceptance of tenders ? 8

7. How do you proceed when it is necessary to carry out an item not provided in the Contractor's tender ? 8

8. Are pencil entries permissible in measurement books and if yes, what are they ? 7

9. State limits up to which works can be let out on rate list and piecework tender. 7

10. Define the terms 'Original Works' and 'Repairs'. How will you classify the following types of work :— 6

(i) Replacing country tiled roofing by Mangalore tile roofing.

(ii) Superelevation at curves.

(iii) The construction or re-construction of road surfaces for the purposes of experiment.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS IN B. S. E., CLASS II

CENTRAL CIRCLE

Practical test in the use and Adjustment of Levelling Instruments and Theodolite etc. and in Lining out of Work

WEDNESDAY, 15TH OCTOBER 1952

[8 A.M. TO 11 A.M.]

Marks.

1. Derive an accurate expression for setting out circular curve by the method of either (i) offsets from tangents or (ii) ordinates from long chord. Also derive the expression for finding out length from tangent point to locate the vertex point in case of (i) and for versed sin in case of (ii). **10**

2. From the above expression calculate the elements for setting out the following curve (at 25′ intervals) :— **10**

(1) Deflection angle 30°

(2) Radius of curve 500′

(Sin 15° = 0·2588 Tan 15° = 0·2679)

(Use slide rule or tables for square roots but better derive a suitable approximate expression for dealing square roots involved in the calculations.

3. Set out the tangents and long chord for the above curve and set out the curve. Measure and state its length. **10**

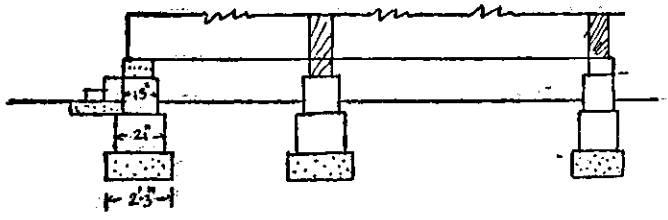
(*Note.*—You will be given only Mazdoor to assist you).

4. Measure the horizontal angle by the theodolite set up (checking it) between the 2 given marks by repetition method. **10**

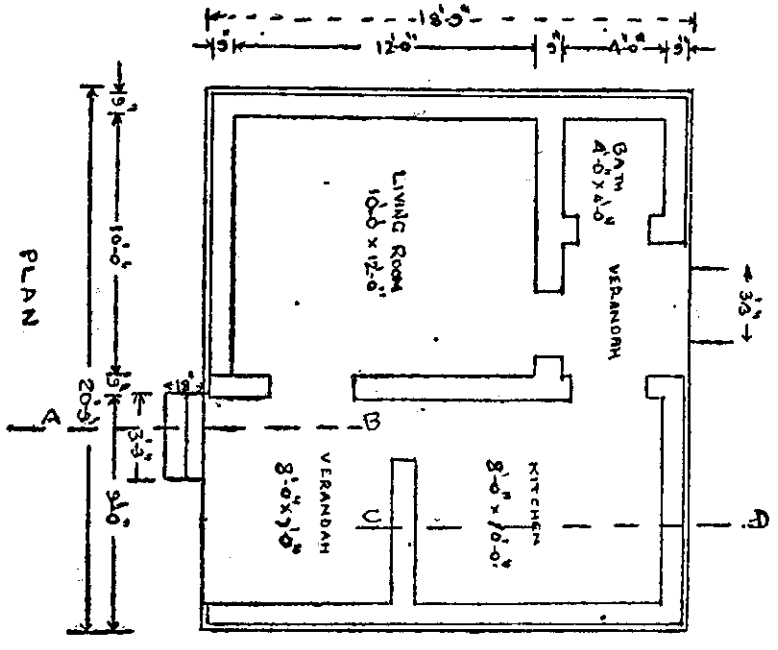
5. The level given to you has its one foot screw jammed marked by white chalk which cannot be operated. Set up the instrument and level it and take levels on the 4 pegs *A B C & D* and state the relative difference between *A & B*, *B & C*, *C & D*, *D & A*, fill the readings in a usual form. **10**

Alternative to questions 1, 2 and 3 for candidates other than for Roads and Buildings.

1. Prepare a detailed record foundation plan for the building as per accompanying plan and line out the foundation trenches. Calculate the diagonals and measure them on your lining out and note down.



SECTION ON ABCD



PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B.S.E., CLASS II

CENTRAL CIRCLE

General Engineering connected with Water Supply and Sanitary Engineering

MONDAY, 13TH OCTOBER 1952

[11 A.M. TO 2 P.M.]

Marks.

1. Explain briefly any *three* of the following :— 9

   (*a*) Artesian wall.

   (*b*) Infiltration gallery.

   (*c*) Yield and recuperation power of a wall.

   (*d*) Maximum flood discharge from a catchment.

2. A town obtains its water supply from an impounding reservoir having an earthen dam of 54 feet in height. Explain clearly with sketches the following :— 10

   (*a*) Arrangement of foundation so as to make them safe against percolation and against slipping of the dam.

   (*b*) Arrangement of materials in the work of the dam.

3. What is meant by coagulation of water ? Write short notes on the chemicals used for the purpose and describe various methods adopted for securing economical and efficient coagulation. 9

4. Why is disinfection of public water supply considered necessary even when filtration is provided ? State various materials used in this disinfection. 9

5. The town of Malegaon has constantly recurring epidemics of Cholera and Typhoid. Various schemes are suggested to permanently stop these diseases. State which particular scheme you would give preference and guarantee the removal of the epidemics. Describe your scheme in short detail. 10

6. Write short notes on any *three* of the following :— 9

   (*a*) Standard to be followed for permissible impurities in a potable water supply.

   (*b*) pH valve.

   (*c*) B.O.D.

   (*d*) Algae control in water-supply.

   (*e*) Hydraulic ram.

Marks.

7. Write out detailed short specification for construction of a four seated aqua privy block in a District Judge's Court compound. 9

8. Write out an M. & R. estimate for supply of water to a town with following data :— 10

Water is obtained from a river infiltration works. Water is pumped by a deep well turbine pumps run by electrical motor against a head of 110 ft. Current is available at one anna per unit. Daily supply is 0·8 million gallons pumped in 8 hours in the R. C. elevated town reservoir. Management of distribution system is not under your control.

9. Sketch and explain the uses of— 9

(1) Sewer traps.
(2) Cowl-ventilator for water supply.
(3) Ventilator for sewerage system.
(4) Surface drains.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

General Engineering connected with Water Supply and Sanitary Engineering (Oral)

TUESDAY, 14TH OCTOBER 1952

Marks.

1. What are the present day rates of— 8

(*a*) Chlorine gas per lb.
(*b*) 9″ dia. spun C. I. pipes per ft.
(*c*) Coursed rubble masonry in cement mortar 1 : 4.

2. What is the difference between chloramine treatment of water and pre-chlorination of water? 9

3. What timber will you use for (*a*) furniture in Raj Bhavan, (*b*) Packing cases for despatching an oil engine, (*c*) Dance floor at a first class club. 8

4. What load will you allow for foundation of columns for an elevated reservoir in— 8

(*a*) Soil,
(*b*) Murum,
(*c*) Hard rock.

Marks.

5. How many 9″ diameter vertically cast C. I. Pipe each 12′ long can you carry in a three ton truck ? 9

How many c. ft. of coal will go in the above truck ?

6. What are the average daily wages in your District of— 8

(*a*) Female coolie,
(*b*) A pipe jointer,
(*c*) An Oil Engine Driver,
(*d*) A blacksmith.

7. Quote rates for labour prevalent in your district for— 9

(*a*) Excavation in wet soil for foundation 10′ deep lead 100 feet.

(*b*) Brick masonry first sort in cement mortar 1 : 4 proportion.

(*c*) Laying and jointing 12″ dia. stone-ware sewer.

8. What are the carolic values of— 8

(*a*) coal of average quality,
(*b*) light diesel oil,
(*c*) Sludge gas.

9. Under what circumstances would you recommend— 8

(*a*) Bullock cart and

(*b*) Motor lorries as a medium of transport of dry refuge of a town. State the various advantages of a bullock cart fitted with pneumatic outfit over an ordinary iron tyred one.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

Water Supply and Sanitary Engineering

13TH OCTOBER 1952

[3 P.M. TO 6 P.M.]

N.B.—Answer any *eight* questions.

Marks.

1. An inz-type R. C. elevated reservoir of 2 lakh gallons capacity is to be constructed in two compartments. Draw in plan and section the arrangement of inlet, outlet washout and overflow pipes, giving sizes of each and showing all required fittings. 10

Marks.

2. What is activated sludge process in sewerage purification. Describe this in details, with sketches. Under what circumstances will you recommend this treatment for a District town in Bombay State. 10

3. Write short notes with sketches on any *four* of the following :— 9

(*a*) Chlorinator, (*b*) Contact bed, (*c*) Pneumatic collection of sewerage, (*d*) Valve tower, (*e*) Isohyetal chart of rainfall in India.

4. Propose a suitable scheme for village sanitation in respect of its conservancy and prevention from Malaria and other water borne deseases. 9

An approximate cost of the proposed works for a village of 500 people should also be indicated in an estimate form.

5. Sketch fully the dimensioned plan and section of a double chambered septic tank and trickling filter for the treatment of sewage from a hospital of 100 beds. 9

6. It is proposed to supply water to a city block containing 8,000 people from a tube well of 8″ diameter through an 9″ rising main via 40 feet R. C. water tower. Calculate the BHP of oil engine for 8 hours daily pumping and based on the following data :— 10

City is provided with sewers;

Length of rising main = 5,000 c. ft. rest water level, in tube well = 20 feet below G. L.;

Depression of water level while pumping.

The required discharge = 25 feet; the maximum water level in the water tower = 40 feet above the ground; frictional loss in the rising main = 0·024 per yard. Efficiency of pumps and oil Engines 85 per cent. and 60 per cent. respectively.

7. State the Hazen and William formula for discharge of water through pipes. 9

Two reservoirs are connected by a 12″ diameter straight hume pipe line 10,500 ft. long. If the difference in water level in the two reservoirs be 105 ft., find the discharge through the pipe line in gallons per minute.

8. Write a detailed note on the sludge digestion dealing fully with the chemical as well as Engineering aspect of the problem, 9

Marks.

9. An infiltration well 25 feet in diameter 15 feet below bed of river is to be sunk in the river Orsang at Dabhoi. Give a dimensioned sketch of the R.C. curb you will require for this well. Work out an estimate for sinking such a well. 10

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

Water Supply and Sanitary Engineering (Oral)

WEDNESDAY, 15TH OCTOBER 1952

Marks.

1. State appropriate quantity of various forms of Nitrogen in fresh domestic sewage of a town having water supply rate of 40 gallons per head per day. 9

2. What is outfall sewer? Of what various materials can it be constructed for a town having a population of about 5,00,000? 8

3. What is sanitary well? What is the difference between a deep well and a tube well? 8

4. What minimum gradient will you adopt while laying 9" and 12" sewer and why? 9

5. What is free chlorine in water? What quantity of this will you recommend in your water at the water works end. How will you check this readily. 8

6. What are the various types of the belt drive you know of? Where will you use each? 8

7. What is dry or solid refuse? What are the various methods of its disposal? 8

8. What is trade waste and how will you dispose it off in a town, which is provided with sewerage system. 8

9. What standard of purity will you lay down for a good potable water supply? Specify qualities indispensible for its acceptance as such. 9

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

General Engineering connected with Lift Irrigation (Oral)

TUESDAY, 14TH OCTOBER 1952

[3 P.M. ONWARDS]

	Marks.
1. Give the quantities of the following materials which can be conveyed in a bullock cart :— (*a*) Burnt bricks. (*b*) Sand. (*c*) Mangalore tiles. (*d*) Stone metal.	8
2. What precautions you would take to prevent blowing off, of asbestos sheets of roof, by high winds.	9
3. What procedure is followed if you require private land urgently for your work.	10
4. Mention waterway in square feet, necessary for the cross drainage work to drain off the catchment area of 60 acres.	9
5. How much allowance you would make for transit losses in designing the capacity of Irrigation channel at its head ?	10
6. What is slump test ? What slump is permissible for mass concrete in foundation ?	10
7. Quote the formulæ for discharge through S.W.F.	9
8. How would you distinguish between leakage and percolation water through the bank of the Irrigation Channel.	10
Total ..	75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

Construction of Maintenance of Lift Irrigation Schemes (Oral)

WEDNESDAY, 15TH OCTOBER 1952

[2 P.M. ONWARDS]

	Marks.
1. Define the term " Duty " and " Day Cusec "	9

Marks.

2. What duty would you adopt at the distribution for Sugarcane, wheat, jowar crops in Rabi Season ? 10

3. What is a Jack well and where its construction can be dispensed with ? 9

4. At what level would you fix pumps, with reference to the lowest water level in the intake chamber ? 9

5. State water rates recovered for various crops irrigated by one of the Lift Irrigation scheme in your charge. 10

6. At what distance apart an expansion joint is necessary for rising main of cement concrete pipes ? 9

7. What proportion would you specify for cement mortar to be used in (*a*) the masonry of the intake chamber, (*b*) Masonry of the steining of Jack well, and (*c*) Joints of Hume pipes in rising main. 9

8. How would you test the rising main for leakage through joints ? 10

Total 75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

General Engineering connected with the use of Machinery (Oral)

TUESDAY, 14TH OCTOBER 1952

Marks.

1. Enumerate the tools and appliances required for— 8

(*a*) A Turner to undertake any job on Lathe.

(*b*) Welder to prepare M. S. tank 4′ × 4′ × 4′ with manhole cover.

2. Enumerate any *six* tools a blacksmith uses and state for what purpose each is used. 8

3. State suitable materials for— 9

(1) Diamond bit.
(2) ' V ' block for marking.
(3) Boring casing pipe.
(4) Fly wheel of an oil engine.

Marks.

4. What are the present day prices of— 9

(1) Good steam coal.
(2) Light diesel oil.
(3) Cotton waste.
(4) Grease.
(5) Aloe rope.

5. What are the prevalent rates in your District for the following :— 8

(1) Fitter.
(2) Engine Driver.
(3) Oilman.
(4) Plumber.

6. Give the calorific value of— 9

(1) " B " grade steam coal.
(2) Light diesel oil.
(3) Sludge gas.

7. What do you understand by— 8

(1) Carbon-tool steel.
(2) Alloy tool steel.

Where are they best used.

8. What are the advantages of vertical diesel engines over horizontal ones. Which will you prefer for the following :— 8

(1) A large city water supply.
(2) A Village water supply.
(3) Generation of electricity.

9. Name the various types of belt drive. State when each is best used. 8

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

Use of Machinery

MONDAY, 13TH OCTOBER 1952

[3 P.M. TO 6 P.M.]

Marks.

1. It is proposed to put up a small automobile workshop for repairs to motor cars and trucks, give a layout plan of the proposed workshop showing all machine tools, you will install giving reasons for your selection. Write out an estimate for purchase of all equipment. 10

Marks.

2. What are the different methods adopted for governing the speed of an oil engine. Describe with sketches any two of them in detail. 9

3. Give in detail the difference between a Turet and a capstan lathe. Give two examples of work best done by each of these lathe. 9

4. Draw a section of a modern type centrifugal pump with suction capable of pumping end 100,000 gallons of screened sewage per hour against a head of 200 ft. Draw suitable characteristic curve for this pump. 10

5. It is required to pump 18 million gallons of water per day for supply to the town. The total head from all causes is 220' suction head being 36 ft. What type of pumping machinery you will install, giving reasons for your selection. Work out the horse power of prime mover for each unit you propose to install. 10

6. Name the various types of boring machines you know of. Describe the type of machine you will use for drilling for artesian water supply in North Gujarat area. 9

7. Write out an indent with detail specification for ordering the following :—8 Nos. of $\frac{3}{4}$ cubic yard shovels. 24 Nos. of 5 ton diesel driven tippers. 3 Nos. of double drum sheeps foot roller with suitable tractor to drive them. Give approximate cost for each of these items. 9

8. What is the difference in working of a 12-15 cubic yard scrapper and $\frac{3}{4}$ cubic yard shovel? On what type of jobs will you recommend the use of each ? Give operating cost of 3 Nos. of above scrapper and 4 Nos. of above shovels working with 6 cubic yard diesel tippers. Lead in each case 1 mile each way. 9

Total .. 75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

CENTRAL CIRCLE

Use of Machinery (Oral)

WEDNESDAY, 15TH OCTOBER 1952

Marks.

1. What lubricants you would use for— 10
   (*a*) Cylinder of diesel engine.
   (*b*) Gear Boxes.
   (*c*) Roller bearings.
   (*d*) Crank chamber of a vertical Oil Engine.

Marks.

2. Describe in short— 9

(*a*) Sight Feed Lubrication.
(*b*) Pressure Lubrication.
(*c*) King Lubrication.

3. Describe the function and utility of the following :— 9

(*a*) Fly wheel.
(*b*) Fusible Plug.
(*c*) Governor.

4. Define :— 9

(*a*) Water Horse power.
(*b*) Brake Horse power.
(*c*) Electrical Horse Power.

5. You are given the choice between a pneumatic hammer and steam hammer of same weight for duty in general purpose workshop, which will you select and why ? 10

6. What do you understand by— 10

(*a*) Indicator Diagram.
(*b*) Lightening conductor.
(*c*) Alignment conductor.

7. State where the following are used :— 9

(*a*) Reflux valve.
(*b*) Bye pass valve.
(*c*) Air Valve.

8. Distinguish between :— 9

Soldering, brazing and welding.
Why is flux necessary in the above process ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

General Engineering—Irrigation (Written)

MONDAY, 13TH OCTOBER 1952

[TIME ALLOWED—3 HOURS]

Marks.

1. Explain what you understand by the following, with a sketch where necessary :— 10

(i) Cofferdam,
(ii) Bulkage and shrinkage,
(iii) Water-cushion,
(iv) Retrogression,
(v) Core-wall.

Marks.

2. You are required to prepare a project for a proposed major irrigation scheme with a storage :— 12

(*a*) Mention the various items of investigations you would carry out for fixing the capacity of the storage dam required, and the purpose of each.

(*b*) Under what circumstances are such schemes recommended to be dropped ?

3. Describe the physical characteristics and engineering properties of the following building stones, and state what are the limitations as regards their use in hydraulic structures :— 9

(i) Trap stone ;
(ii) Laterite stone ;
(iii) Sand-stone (Quartzite).

4. Write out specifications for the following items :— 8

(i) Brick-work, 2nd class ;
(ii) Stone-pitching for an earthen dam,

Or

Lime plaster, rough, $\frac{3}{4}$" thick.

5. What precautions would you take while the following are in progress ? :— 9

(i) Blasting operations in a canal cut,
(ii) Excavation of a deep cut-off trench,
(iii) Construction of a tall masonry wall,

Or

Write short notes on the following :—

(i) Uplift pressure,
(ii) The function of under-sluices,
(iii) Advantages of lining a canal.

6. Describe the causes of land-damage in irrigated areas and the measures necessary to prevent such damage. What are the usual methods of reclaiming damaged lands ? 9

Or

Specify the various types of spillways and briefly discuss their comparative merits and demerits.

7. You are required to design a distributary. State what data you will collect and how you will make use of it in designing the capacity of the distributary. Give a numerical example, assuming your own data. 10

8. Draw a neat dimensioned sketch showing the cross-section of a canal cut in black soil, service road, spoil bank, land-width required and other details, if any. Bed width and F. S. D. of the canal are 20 feet and 5 feet respectively. 8

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

General Engineering—Irrigation (Oral)

TUESDAY, 14TH OCTOBER 1952

Marks.

1. Name a few trees suitable for being planted in canal land. 5

2. Under what circumstances are the following used :— 10
   (i) Piles ?
   (ii) Raft-foundation ?
   (iii) Damp-proof course ?
   (iv) C. C. curbing for wells ?
   (v) Mass concrete ?

3. What proportions of lime and sand would you specify for— 6
   (i) Plaster work ?
   (ii) Foundation concrete ?
   (iii) Super-structure of a masonry water-tank ?

4. What precautions will you take while storing— 9
   (i) Cement ?
   (ii) Timber ?
   (iii) Machinery parts ?

5. What is water-cement ratio and how does it affect the strength of concrete ? 8

6. What safety works are provided on canals ? What is the purpose of each ? 6

7. What do you understand by— 5
   (i) Drainage gallery ?
   (ii) Transit losses ?
   (iii) Sweating ?
   (iv) Salt efflorescence ?
   (v) First class irrigation work ?

8. What is the purpose of— 10
   (i) Hump of a S. W. F. ?
   (ii) Tail tank ?
   (iii) Central drain in the bed of canal ?
   (iv) Soil classification surveys ?
   (v) Collecting flood water samples ?

Marks.

9. What would you specify as daily task-work for— 6

(i) a mason for laying rubble masonry 3rd sort ?

(ii) a male mazdur for breaking stonechips $\frac{3}{4}$" size ?

(iii) a hired truck for conveying bricks, the lead being 5 miles ?

10. How do you determine the following :— 10

(i) the actual proportion of sand and lime in lime mortar ?

(ii) absorption and evaporation losses in a particular section of a canal ?

(iii) Dependable yield of a well ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

General Engineering—Roads and Buildings (Written)

MONDAY, 13TH OCTOBER 1952

[TIME ALLOWED—3 HOURS]

Marks.

1. Explain with sketches— 15

(*a*) A wing wall ;
(*b*) A Return wall ;
(*c*) Afflux ;
(*d*) Water cushion ;
(*e*) Purlin rafter construction ;
(*f*) Through stones ;
(*g*) Stretchers ;
(*h*) Catch water drain ;
(*i*) Newel ;
(*j*) Water tables.

2. Explain the necessity of spreading blindage on water bound macadam road during dry weather. What would happen to the road surface if blindage is not spread during dry weather ? 6

3. Write a short note on the precautions necessary in surfacing a water bound macadam road and explain the object of each precaution. 12

4. Would you be able to say definitely by inspecting a water bound macadam road whether the summer maintenance of the road is being properly done or not and also monsoon repairs ; if so, explain how you would arrive at the conclusion. 8

Marks.

5. What tests would you apply to lime to ascertain whether it is "Hydraulic" or "fat"? 5

6. What are the chief causes of cracks in structures and what steps would you take to prevent them? 7

7. (*a*) What thickness of walls will you adopt for a three storied hostel building, each storey 12 feet high? 5

(*b*) Give reasonable daily out-turn per artisan or labourer for—

(i) Laying brick masonry,
(ii) Dressing 8" khandkies,
(iii) Cement pointing Shahabad stone floor,
(iv) Excavation in soft murum,
(v) Chiselling hard rock.

8. Prepare an abstract estimate for carrying out annual repairs to a first class road having a metalled width of 12 feet and formation width of 20 feet. 15

Length of road	20 miles.
Bridges	1 of 5 spans of 20 feet each.
Culverts and drains	60 Nos.
Lead for trap stone metal ..	$2\frac{1}{2}$ miles.
Lead for sand	1 mile.
Lead for soft murum	$1\frac{1}{2}$ miles.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

General Engineering—Roads and Buildings (Oral)

TUESDAY, 14TH OCTOBER 1952

Marks.

1. (*a*) Where do you leave construction joints in the case of R.C.C. slab and beams? 11

(*b*) What is the function of stirrups in R.C.C. beams?

(*c*) When sufficiently long bars are not available, how do you make the overlap joints in reinforcement?

(*d*) When there are a number of overlap joints in various rows of reinforcement of an R.C.C. arch, how will you arrange them?

Marks.

2. Explain what is meant by the following and the purpose served by them— 10

(1) Weep holes.
(2) Rat lip.
(3) Tempate.
(4) Boning rod.
(5) Cut back asphalt.
(6) Expansion joint in a roadway concrete slab.

3. (*a*) Give the size for a motor garage. 10

(*b*) How would you destroy roots and vegetation in masonry ?

(*c*) How would you remove old paint or varnish from surfaces ?

(*d*) How would you prepare paint for a black board ?

4. State how much material of each kind is required for— 10

50 sft. of white wash—3 coats ;
100 sft. of oil paint—1 coat ;
100 sft. of cement plaster $\frac{3}{4}$" thick ;
100 Cft. of C. R. masonry 3rd sort 18 inches thick.
100 Cft. of cement concrete of 1 : 2 : 4 proportion.

5. How do you measure for payment the following :— 6

(1) Rubble ?
(2) Road metal ?
(3) White washing of walls having doors and windows ?
(4) Masonry of walls with doors and windows ?

6. What stresses would you allow for cement concrete 1 : 2 : 4 for — 6

(i) Tension ?
(ii) Direct compression ?
(iii) Shear ?
(iv) Bond ?

7. What are the current rates for the following in your Division :— 10

(1) Cut teak wood up to 12 feet length ?
(2) Rubble at quarry ?
(3) Slaked lime ?
(4) Cement concrete 1 : 4 : 8 in foundation ?
(5) Burnt brick masonry 2nd sort in cement mortar 1 : 6 without pointing ?
(6) Mangalore tiled roof ?
(7) Asbestos sheet roofing ?

Marks.

8. What are the safe permissible loads on— 12

(i) Black soil ?
(ii) Murum ?
(iii) Wet clay ?
(iv) Loose sand ?
(v) Random rubble in lime mortar ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Irrigation and Irrigation Act (Written)

MONDAY, 13TH OCTOBER 1952

[TIME ALLOWED—3 HOURS]

Marks.

1. Write short notes on the following :— 9

(i) Block system ;
(ii) Preliminary irrigation programme ;
(iii) Water-logging.

2. What are the different methods of assessing water rates ? Discuss the advantages and disadvantages of each. 10

3. (*a*) Discuss the various causes that lead to the reduction in the carrying capacity of irrigation channels. 8

(*b*) State what measures you would adopt to maintain the efficiency of an existing canal.

4. Describe the rights and obligations of owners of water-courses under the Irrigation Act. 8

Or

Under what circumstances can the supply of water to any water-course or to any person entitled to such supply be stopped ?

5. What is a minor irrigation work ? What are its types ? What are the characteristic features of each type ? 6

6. You are in charge of five distributaries of a canal. Prepare a water-indent for a rotation by making your own assumptions. 8

Or

Describe a suitable method of gauging a small stream. What errors is such a method liable to and how can they be avoided ?

Marks.

7. Write a note on the soils met with in your area with particular reference to— 12

(i) their types, (ii) the characteristics of each type, and (iii) the extent of suitability of each type for irrigation.

Or

What are the advantages and disadvantages of the following ? :—

(i) Rush irrigation ;
(ii) Volumetric supply ;
(iii) Sanctioning crops on long-term basis.

8. (*a*) How are irrigated crops classified ? 8

(*b*) Specify a few crops of each type.

(*c*) Name any *four* irrigated crops of your area and state at what interval is each usually watered.

9. Explain the following with sketches where necessary :— 6

(i) Super-passage ;
(ii) Record of Rights ;
(iii) Stop-gate.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Irrigation and Irrigation Act (Oral)

WEDNESDAY, 15TH OCTOBER 1952

Marks.

1. What points would you pay special attention to while inspecting— 9

(i) an escape ?
(ii) an outlet gate ?
(iii) an S. W. F. ?

2. Explain— 10

(i) Hydro-iso-bath ;
(ii) Sub-soil water-table ;
(iii) Semi-module ;
(iv) Cultivable irrigable area ;
(v) Post-seasonal watering.

3. (*a*) What is a *punchanama* ? 6

(*b*) What are its types ?

Marks.

4. (*a*) What investigations are necessary for a Bandhara scheme ? 6

(*b*) How would you locate the off take of the irrigation channel from a bandhara to minimise silting ?

5. What is the procedure of assessing and collecting irrigation revenue ? 8

6. What measures are necessary in the case of an existing canal system to prevent the spread of Malaria ? 6

7. What action would you take when the irrigators under a second class Irrigation work fail to fulfil the obligations imposed on them ? 7

8. (*a*) Define an irrigation year and its seasons. 6

(*b*) Which season is the heaviest for the purposes of irrigation and why ?

9. What precautions are necessary in irrigation practice to ensure economic use of canal-water ? 8

10. Have you read any reference books or other publications on Irrigation Practice ? Name three of them. 3

11. What do you understand by dating a pass ? What is its purpose ? 6

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Design and Construction of Earthen Dams (Written)

MONDAY, 13TH OCTOBER 1952

[TIME ALLOWED—3 HOURS]

Marks.

1. Name the various soil tests that are necessary for designing an earthen dam and briefly describe the significance of each. 12

Or

Specify what factors of safety you would aim at while designing an earthen dam.

2. Write out specifications for selecting and laying the material required for— 10

(i) the hearting, and

(ii) the casing of an earthen dam.

Marks.

3. Explain the following briefly with sketches, where necessary :— 10

(i) Seepage ;
(ii) Draw down ;
(iii) Cut-off trench ;
(iv) Flow-net ;
(v) Hydraulic gradient.

4. What are the usual causes of failures of earthen dams ? How are they detected and remedied ? 12

Or

Under what circumstances is an earthen dam most suitable ? What are its essential features and what is the purpose of each ?

5. It is proposed to provide a saddle waste-weir of over-fall type for an earthen dam. The maximum flood to be routed is 40,000 cusecs, and the depth of flow is to be restricted to 9 feet :— 12

(*a*) Calculate the length of weir-crest required ;

(*b*) State the assumptions, if any, made by you for calculating the weir length ;

(*c*) Draw a sketch showing the cross-section of the waste-weir arrangement and name its different parts.

6. You have inspected an earthen dam in the month of April. Write out an inspection note. 9

7. A detailed project for a large earthen dam is to be prepared :— 10

(*a*) Enumerate the various items of investigation necessary.

(*b*) Frame a rough survey estimate for carrying out all the investigation necessary for completing the project.

Or

Give neat sketches showing the drainage arrangement you would adopt for an earthen dam under normal conditions.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Design and Construction of Earthen Dams (Oral)

WEDNESDAY, 15TH OCTOBER 1952

Marks.

1. What is the effect of oversaturation in an earthen embankment ? How is it dealt with ? 7

Marks.

2. What are the characteristics of a good core material ? 6

3. How is the frictional resistance of soils determined ? 8

4. What are the different methods of calculating maximum flood intensity ? 8

5. How is hydraulic gradient in an existing earthen dam ascertained ? 6

6. Mention the different types of cut-offs you know, and say under what conditions each is used. 10

7. How do you determine the silting capacity of a storage dam ? 8

8. An earthen dam is to be constructed in a fairly narrow gorge. Suggest suitable methods of flood diversion, during construction. 12

9. What do you understand by— 10

(i) Rip-rap ?

(ii) Cohesion ?

(iii) Dead storage ?

(iv) Absorption losses ?

(v) Mechanical analysis of soils ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Roads and Buildings with Special Reference to Modern Types of Roads Construction (Written)

MONDAY, 13TH OCTOBER 1952

[TIME ALLOWED—3 HOURS]

Marks.

1. Write out a suitable specification for blacktopping a State road from the maintenance and repairs grants. What would the treatment roughly cost per 100 square feet ? 10

2. How would you try to prevent and minimise corrugations in water bound macadam surface ? 8

3. What are creteways ? Illustrate with a neat cross-section showing all the details in the whole width of formation. 9

Marks.

4. A cement concrete road has become pitted after long use. Suggest some cheap method to modernise it. 8

5. Give merits and demerits of cement concrete and asphalt road surfaces. 8

6. State the various survey data and other information that have to be collected for the preparation of plans and estimates of a Major Bridge. 15

7. On inspecting the masonry work of a building in course of construction, what defects would you look for ? 8

8. Explain with neat sketches— 9

(*a*) Voussoir ;
(*b*) Semi-grout ;
(*c*) Summit curve ;
(*d*) Collar beam truss ;
(*e*) Skew back ;
(*f*) Valley curve.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Roads and Buildings with Special Reference to Modern Types of Roads Construction (Oral)

WEDNESDAY, 15TH OCTOBER 1952

Marks.

1. Explain— 10

(*a*) Barrelling ;
(*b*) Berm ;
(*c*) Catchwater drain ;
(*d*) Side-long ground ;
(*e*) Ruling gradient ;

What are the objects or uses of (*a*), (*b*) and (*c*) ?

2. What points would you look to in selecting the following materials for the construction of a building work— 10

(*a*) Stone for face work ?
(*b*) Stone for hearting ?
(*c*) Lime Kankar ?
(*d*) Sand ?

3. A stone masonry arch of 30 feet span is complete. How will you lower the centring and remove the trusses ? 9

Marks.

4. (*a*) Explain the following classification of C. R. estimate of a road :— 9

(i) Surface Repairs ;
(ii) Reserve Metal Collection ;

(*b*) Maintenance.

5. What is the latest classification of Roads ? 9

On what does the nature of the wearing surface of a proposed road depend ?

6. What is the camber you would allow for— 9

(*a*) Water bound macadam road ?
(*b*) Asphalt road ?
(*c*) Cement concrete road ?

7. What are the usual scales of the following maps and drawings :— 9

(1) Topo sheets ?
(2) Degree sheets ?
(3) Village maps ?
(4) Detailed plan for buildings ?
(5) Plan and longitudinal section of roads ?
(6) Cross sections of Roads ?
(7) Contour plan for a bridge-site ?

8. (*a*) What factors decide as to whether a bridge should be designed as high level or submersible ? How will you fix the formation level in the latter case ? 10

(*b*) State the various points you would consider while fixing the alignment of a road.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Accounts and Rules of the Public Works Department (Written)

TUESDAY, 14TH OCTOBER 1952

[TIME ALLOWED—3 HOURS]

Marks.

1. Explain— 8

(*a*) Write back.
(*b*) Remittance Transfer receipt.
(*c*) Register of Works.
(*d*) Workslip.
(*e*) Advice of transfer debit.

Marks.

2. What are the recognised systems by which work can be carried out by the P. W. D. and in what respects do they differ from each other ? 7

3. What are the following and when do you prepare them ? 10

(i) Revised estimate,
(ii) Supplementary estimate,
(iii) Reduced estimate,
(iv) Completion Report,
(v) Completion certificate.

4. What are the powers of the Superintending Engineers and the Executive Engineers— 10

(i) to sanction estimates for original works and repairs for—

(*a*) Roads and Buildings ?
(*b*) Irrigation ?
(*c*) Village Water Supply ?

(ii) to accept tenders ?

(iii) to sanction extra items ?

(iv) to sanction excesses over estimates ?

5. The following changes have been made in an existing Government building — 6

(i) A 6-feet wide verandah is made 10 feet wide,

(ii) Country tiled roof is changed into Mangalore tiled one,

(iii) Old decayed windows and replaced by new ones.

State how each of these items will affect the capital value of the building.

6. What are the rules for taking measurements and keeping measurement books ? Why is a measurement book considered as of a prime importance of accounts ? 14

7. (*a*) What is stock ? 8

(*b*) How is issue rate for stock to be fixed ?

(*c*) In what circumstances can materials be issued to the contractors and at what rates are the materials to be issued ?

8. What are contract documents and what do they include ? 7

9. What is the procedure to be followed if a cheque is to be cancelled ? 5

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Accounts and Rules of the Public Works Department (Oral)

WEDNESDAY, 15TH OCTOBER 1952

Marks.

1. What are the powers of a Deputy Engineer in respect of— 5

   (*a*) Acceptance of tenders ?
   (*b*) Rate lists ?
   (*c*) Payment of First and Final Bills ?
   (*d*) Running account Bills ?
   (*e*) Advance payments ?

2. Distinguish between :— 8

   (*a*) " Earnest Money " and " Security Deposit ".
   (*b*) " Sub-work " and " Sub-Head ".
   (*c*) " Market Rate " and " Issue Rate ".
   (*d*) " Major work " and " Minor work ".

3. (*a*) What conditions must be fulfilled before a work is started ? 10

   (*b*) What precautions would you take in opening tenders to render them secure against tempering ?

4. What percentage deductions are necessary in the following cases :— 6

   (1) Hard Murum ?
   (2) Metal $1\frac{1}{2}$" gauge ?
   (3) Sand ?
   (4) Soft Murum ?

5. (*a*) What is the procedure for acquiring land for Public Works Department ? What steps are necessary to minimise delays in Land Acquisition Proceedings in so far as the Public Works Department is concerned ? 10

   (*b*) What is the minimum amount below which a P.W.D. cheque cannot be drawn ?

6. What will you do when— 10

   (1) Any surplus cash is found in your chest when counting at the end of the month ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Accounts and Rules of the Public Works Department (Oral)

WEDNESDAY, 15TH OCTOBER 1952

Marks.

1. What are the powers of a Deputy Engineer in respect of— 5

   (*a*) Acceptance of tenders ?
   (*b*) Rate lists ?
   (*c*) Payment of First and Final Bills ?
   (*d*) Running account Bills ?
   (*e*) Advance payments ?

2. Distinguish between :— 8

   (*a*) " Earnest Money " and " Security Deposit ".
   (*b*) " Sub-work " and " Sub-Head ".
   (*c*) " Market Rate " and " Issue Rate ".
   (*d*) " Major work " and " Minor work ".

3. (*a*) What conditions must be fulfilled before a work is started ? 10

   (*b*) What precautions would you take in opening tenders to render them secure against tempering ?

4. What percentage deductions are necessary in the following cases :— 6

   (1) Hard Murum ?
   (2) Metal 1½" gauge ?
   (3) Sand ?
   (4) Soft Murum ?

5. (*a*) What is the procedure for acquiring land for Public Works Department ? What steps are necessary to minimise delays in Land Acquisition Proceedings in so far as the Public Works Department is concerned ? 10

   (*b*) What is the minimum amount below which a P.W.D. cheque cannot be drawn ?

6. What will you do when— 10

   (1) Any surplus cash is found in your chest when counting at the end of the month ?

Marks.

(2) A Measurement book is lost ?

(3) A mazdoor engaged on your work dies of an accident ?

(4) Old materials are returned to your store after completing repairs ?

7. How do you indicate the following on a Muster Roll— 6

(*a*) Present in the morning, but absent in the evening and *vice versa* ?

(*b*) Present all day ?

(*c*) Absent all day ?

8. What is the procedure when tools— 9

(*a*) are lent temporarily to contractors and returned in good order ?

(*b*) are lost ?

(*c*) become unserviceable ?

9. What is the purpose of— 5

(*a*) Daily Reports ?

(*b*) Work Abstracts ?

10. In what circumstances and how is a triplicate receipt book used ? 6

PROFESSIONAL EXAMINATION OF DISTRICT LOCAL BOARD ENGINEERS

SOUTHERN CIRCLE

Local Board Act and Account Code (Written)

TUESDAY, 14TH OCTOBER 1952

[TIME ALLOWED—3 HOURS]

(Full Marks—75)

N.B.—Answer any *seven* questions. All questions carry equal marks.

1. Mention briefly the points you should bear in mind in preparing the budget estimates of your Board.

2. What is the procedure presented in the Local Board Account Code for payment of pensions payable—

(i) wholly by a Board, and (ii) partly by the Board and partly by Government ?

3. How is the Standing Committee of a District Local Board formed ? What are its powers and what restrictions can be placed over its actions by the District Local Board ?

4. (*a*) How are cancelled cheques accounted for in the accounts ?

(*b*) What is a transfer entry and what purpose does it serve ?

5. (*a*) How are cash recoveries reflected in the accounts ?

(*b*) Can lapsed deposits be refunded ? If so, on what conditions ?

6. What are the principles to be observed before and after entering into a contract for an original work costing Rs. 12,000 ?

7. What are the powers of control that can be exercised by the Collector, Director of Local Authorities and Government under the Bombay Local Board Act, 1923 ?

8. What do you mean by Capital and Revenue expenditure ? Define broadly the items that would fall under the latter category.

9. Define :—

(i) Local Fund,
(ii) Cadre,
(iii) Secured advance,
(iv) Deposit works,
(v) Issue rates.

10. The President of a District Local Board sanctions an outstanding payment of Rs. 1,000 to the heirs of a deceased contractor. What objection, if any, will you raise against the action of the President ?

PROFESSIONAL EXAMINATION OF DISTRICT LOCAL BOARD ENGINEERS

SOUTHERN CIRCLE

Local Board Act and Account Code (Oral)

WEDNESDAY, 15TH OCTOBER 1952

[TIME ALLOWED—1 HOUR]

(Full Marks—75)

N.B.—All questions carry equal marks.

1. Why are measurement books and muster rolls considered as very important account records ?

2. What are the District Local Board Engineer's powers to sanction contracts and pieceworks ?

3. What points require to be investigated before passing a contractor's final bill for payment ?

4. What are Works Abstracts ? What purpose do they serve ?

5. What do you mean by Permanent Advance ? What items of expenditure can be met out of that advance ?

6. What is meant by a Suspense Head ? When are the items under this head cleared ?

7. What is a Service Book ? Why is it necessary ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

A practical test in the use and adjustment of levelling instruments and theodolite and in lining out of work

THURSDAY, 16TH OCTOBER 1952

[TIME ALLOWED—3 HOURS]

Marks.

1. Set out a circular curve of 200 feet radius with chord and off-set method using a chord of 16 feet length, the deflection angle between tangents being 45 degrees (tan $22\frac{1}{2}^\circ = 0{\cdot}414$). Measure the length of the curve and state result. **15**

2. Set up the theodolite and read the horizontal angle between two given points. **10**

3. Explain and test the permanent adjustments of the levelling instrument supplied. **25**

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS (ELECTRICAL AND MECHANICAL) AND ASSISTANT ENGINEERS (ELECTRICAL AND MECHANICAL)

ELECTRIC GRID DEPARTMENT—GOVERNMENT OF BOMBAY

Accounts and Rules of the P. W. D. (Written Paper)

MONDAY, 13TH OCTOBER 1952

[2-30 P.M. TO 5-30 P.M.]

N.B.—Question No. 1 is compulsory. In addition any *six* questions may be attempted.

(Marks—75)

Marks.

1. Post the following transactions in the cash book and make closing entries including certificate of verification of cash balance :— 15

	Rs.	a.	p.
1st October 1950, Cash Balance brought forward from last account—			
Rs.			
Cash in chart .. 27			
Imprest with S. D. O., A. B. .. 75			
Temporary advance with store keeper. 50			
	152	0	0
1st October 1950, withdrawal of cash from R/Bank for cash in chart on self account.	400	0	0
2nd October 1950 received security deposit in cash at $2\frac{1}{2}$ per cent. from contractor *XY* towards work entrusted to him for carrying out extensions and alterations.	90	0	0
2nd October 1950, received from Messrs. B. S. & Co. Tender fees for work in connection with wiring work of colony buildings. The cash of which is chargeable to "81A, Capital Outlay, etc."	15	0	0
2nd October 1950, remitted by M. O. as a temporary advance to Engineer-in-Charge, Power House, from cash balance in hand for making payment of freight charge	50	0	0

Marks.

2nd October 1950 paid money order commission as office contingencies under head "52A, Other Revenue Expenditure" .. Rs. a. p. 0 8 0

3rd October 1950, treasury challans as detailed below showing the sale of electricity sold, deposits received from consumers have been received from a Power House :—

Date.	*Sale of power.*	*Deposits for service connections.*
	Rs. a. p.	Rs.
28-8-1950 ..	16 4 0	10
29-8-1950 ..	22 8 0	30
31-8-1950 ..	24 12 0	10
	63 8 0	50

.. 113 8 0

5th October 1950, issued a cheque in favour of suppliers for purposes of stock, the works expenditure of the scheme being changeable to the head "53, Capital Outlay" .. 75 0 0

7th October 1950, issued a cheque for Rs. 37-8-0 payable at a Treasury in favour of Shri *P* in recoupment of imprest granted to him in connection with the expenditure on operation and maintenance of a certain Power House. 27 8 0

9th October 1950, issued a cheque in favour of self or order on Treasury *C* for granting a temporary advance to an Engineer stationed there .. 250 0 0

10th October 1950, paid a muster Roll of work of transmission Line. Total amount of muster Roll 260 0 0

Unpaid wages out of the muster Roll 30 0 0

2. State briefly the procedure that is followed in accounting of receipts and issues of stores in quantity and value. 10

Marks.

3. Define :— 10

(*a*) Completion Report.
(*b*) Comparative statement of Tenders.
(*c*) Original work.
(*d*) Rate list.
(*e*) Work slip.
(*f*) Material at site account.

What is the difference between completion Report and work slip and when they are prepared and to whom they are submitted.

4. (*a*) A Project has been prepared and the Government has approved it administratively for Rs. 2,50,000 when the detailed estimates were prepared the cost of the project was likely to be not less than Rs. 2,61,000. What procedure should the Executive Engineer adopt to enable him to get detailed estimates sanctioned. 10

(*b*) During the progress of construction it appeared that the actual cost would amount to Rs. 2,75,000. State briefly the procedure laid down to bring the actual expenditure in line with the administrative approval and technical sanction.

5. In an estimate of a work there is a provision of Rs. 6,500 for works contingencies but the actual expenditure out of the contingencies in only Rs. 300. It is proposed to utilise the saving of Rs. 6,200 for putting up additional items of work which were not provided for in the original estimate. Comment briefly on the proposal and state the correct procedure that should be followed if the additional work is to be carried out. 10

6. Material worth Rs. 250 is purchased for a work for which there is no sanctioned estimate, more funds are allotted and the cost is debited to another work for the time being. State how this can be regularised and rectified. 10

7. State powers to sanction excess over estimates of— 10

Chief Engineer.
Superintending Engineer.
Executive Engineer.

8. (*a*) Under what circumstances can an advance payment be made to a contractor ? What limits are set to the value of such advance payment ? Who can sanction such payments ? 10

(*b*) When can secured advances be given and up to what extent ? What precautions are required to be taken to safeguard interests of Government ? Specify some materials against which such advances should not be made.

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS (ELECTRICAL AND MECHANICAL) AND ASSISTANT ENGINEERS (ELECTRICAL AND MECHANICAL)

ELECTRIC GRID DEPARTMENT—GOVERNMENT OF BOMBAY

Indian Electricity Act, 1910 ; Indian Electricity Rules, 1937 ; The Electricity Supply Act, 1948 (Written Paper)

TUESDAY, 14TH OCTOBER 1952

[2-30 P.M. TO 5-30 P.M.]

(Marks—75)

N.B.—Answer question No. 8 and any *seven* of the remaining questions.

Marks.

1. (*a*) State briefly the requirements to be fulfilled by power cables suitable for 11,000 volts 3 phase cycles installed in a power house, where the voltage of generation is 11,000 volts and the generating units are directly connected to their unit step-up transformers. Give reference to the clauses in Indian Electricity Rules. **9**

(*b*) If the cables are three core lead covered and steel armoured, what precautions are to be taken during their installation and maintenance thereafter. The tests to be applied before the cables are put into service should be stated.

2. (*a*) What are the factors of safety which the owner of aerial lines should adopt for the various items of materials used in their construction, assuming that metal and other types of supports are used ? **9**

(*b*) What factors are taken into consideration in calculating the factor of safety ? Quote references.

3. What protective measures and procedure should be adopted— **9**

(*a*) when aerial lines of 11 kV cross or approach each other,

(*b*) when they cross over trolley wires of 1,500 volts D.C., and

(*c*) meter gauge railway lines.

Marks.

4. (*a*) State the different types of Earthing to be provided in a generating station which is equipped with step-up plant and high voltage switchgear. The generator stator windings and the high tension sides of the transformers are WYE connected. 9

(*b*) Mention briefly the prescribed regulations for earthing of electric supply lines, machines and apparatus and state what provisions should be made for identification of earthed and earthed neutral conductors for tests.

(*c*) What is the function of an earthwire on a 66 kV transmission line and what are the factors to be taken into consideration in selecting the material and size of the earthwire and in locating the earthwire with reference to the position of the live conductors ?

5. (*a*) State the procedure to be adopted and the conditions to be complied with before power supply at a high voltage is delivered to any person other than the distributing licensee. 9

(*b*) State the conditions to be complied with at the consumer's sub-station. If the owner or consumer is not a licensee, what further conditions are to be complied with.

6. (*a*) Briefly explain "Power Factor" and "annual load factor". How will each affect the economics of a power scheme which includes generation, transmission and distribution. 9

How will they influence the cost for electric energy if a two part tariff is adopted including charges for maximum demand in kVA and energy charges on a sliding scale ?

(*b*) Is the two part tariff beneficial to the power supply company as compared with the flat rate system ? If so, explain how ?

7. (*a*) Explain how you would prepare the financial forecast for a large power scheme and mention the various items to be calculated to estimate the revenue, expenditure and net return. 9

(*b*) How does the life of the various items of assets enter into the calculation of the financial forecast ?

8. (*a*) State the different matters for which provision may be made by a State Electricity Board with a view to rationalising the production and supply of electricity. 12

(*b*) What are the conditions under which the Board will be empowered to enter into arrangements for the purchase or sale of electricity ?

(*c*) Write a short note on the functions and composition of the Central Electricity Authority.

Marks.

9. (*a*) Write a short note on Grid tariff and mention the various provisions that may be included. 9

(*b*) State the advantages or disadvantages of Electricity supply by Provincial Electricity Board as compared with private or Government management.

10. (*a*) State the procedure to be adopted by an applicant for an electric power supply licence and mention the particulars that must be included in a draft licence. 9

(*b*) After submitting his application, what further action should be taken by the applicant ?

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS (ELECTRICAL AND MECHANICAL) AND ASSISTANT ENGINEERS (ELECTRICAL AND MECHANICAL)

ELECTRIC GRID DEPARTMENT—GOVERNMENT OF BOMBAY

Accounts (Oral Examination)

WEDNESDAY, 15TH OCTOBER 1952

[2-30 P.M. TO 5-30 P.M.]

(Marks—75)

Marks.

1. Specify the main accounts records which are maintained in a Divisional office and describe each briefly. 9

2. In what ways can a S. D. O. in charge of a Sub-Division obtain funds to finance his works expenditure and establishment charges ? 9

3. What are the essential requirements of a Voucher for purposes of payment ? 9

4. What officers are competent to prepare and examine contractor's bills ? 9

5. Specify the different categories of contracts and give in brief the main requirements of each category. 9

6. Explain :— 12

(*a*) Advance payment.
(*b*) Secured advance.
(*c*) Reduced estimates.
(*d*) Supplementary estimate.
(*e*) Schedule of Rates.

Marks.

7. Security deposit of the contractor is forfeited for damage to works in progress. How is the amount of the deposit to be accounted for ? 9

8. What are the initial records on which the accounts of works are based. 9

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS (ELECTRICAL AND MECHANICAL) AND ASSISTANT ENGINEERS (ELECTRICAL AND MECHANICAL)

ELECTRIC GRID DEPARTMENT—GOVERNMENT OF BOMBAY

Indian Electricity Act, 1910 ; Indian Electricity Rules, 1937 ; The Electricity Supply Act, 1948 (Oral)

THURSDAY, 16TH OCTOBER 1952

(Marks—75)

Marks.

1. Explain the functions of the following :— 11

(*a*) Conductor, Live Conductor.

(*b*) Lightning conductor, Lightning arrester.

(*c*) Current transformer, Voltage transformer.

(*d*) Static Condenser, Synchronous condenser.

(*e*) Overload relay, Impedance relay.

(*f*) Differential relay, Reverse power relay.

2. (*a*) What are the limitations of D. C. power in a large distribution system ? 11

(*b*) Discuss its application for traction and special industries.

(*c*) What are the different types of equipment used for conversion of A.C. to D.C. power ?

3. What are the powers of the Electricity Board to supply electricity ? 11

4. What is ambient temperature and what is the rise of temperature usually permissible as per B. S. S. Specifications for the stator of a generator at M. C. R. with class B insulation, the temperature being measured by embedded temperature detectors ? If the machine is designed for 25 per cent. overload for two hours, what is the permissible temperature rise ? 11

Marks.

5. Before any equipment meant for service on a high tension circuit such as generator, transformer or apparatus pertaining thereto is put into service, what important test has to be carried out by the owner of the plant and what should he do with the results? 11

Give the type of tests required for equipment coming under the following categories :—

(*a*) Normal working pressure does not exceed 1,000 volts.

(*b*) Normal working pressure exceeding 1,000 volts, but does not exceed 10,000 volts.

(*c*) Normal working pressure exceeding 10,000 volts.

Who is authorised to accept manufacturer's test certificates in place of the tests mentioned above ?

6. What are the prescribed tolerances in voltage and frequency, in the case of power supply by a licensee— 11

(*a*) for low and medium pressure.

(*b*) for high pressure.

Why is control over voltage and frequency essential ? If the licensee wants to deviate from the declared pressure and frequency, what action should he take ?

7. What are " Guard wires " and state the conditions which should be satisfied by the guard wire and its installation for the purpose for which it is installed ? 9

BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS.

Question Papers set at the Professional Examinations of Assistant and Deputy Engineers held in 1951

(For official use only)

BOMBAY
PRINTED AT THE GOVERNMENT CENTRAL PRESS.
1952

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

General Engineering connected with Roads and Buildings (Written)

25TH JUNE 1951

[3 P. M. TO 6 P.M.]

N.B.—Answer any *eight* questions. Three marks are reserved for neatness and sketches.

Each question carries nine marks.

1. Give names of three trees which are raised by long cuttings.

Give names of three trees which are raised by short cuttings.

What should be the desirable height or growth of a plant in a nursery before it transplanted on roadside.

Describe various types of tree guards.

2. Why is seasoning of wood required ?

What are the kinds of wood other than Teak available in your Division and which would you recommend for :

(1) Door and window frames.
(2) Door and window shutters.
(3) Trusses and roof scantlings, and what are their present market rates.

3. Give specifications for "Lightening Conductor", and describe how you would test a lightening conductor.

4. Give specification of door pannelled 2nd class with frame with a sketch of a door 6'-8" × 3'-6".

5. Give quantities of materials required for (Answer any *five* of the following) :—

(1) Brick nogging 100 sq. ft.
(2) Distempering 1 coat 100 sq. ft.
(3) Cement concrete 1 : $1\frac{1}{2}$: 3—100 cu. ft.
(4) Mangalore tiles roof 100 sq. ft.
(5) Painting 2 coats on old iron girders—100 sq. ft.
(6) Country double tiled roof 100 sq. ft.

6. What are rutes and hollows ? How are they formed and to be attended to ? What instructions you will give to your subordinates for repairs to pot holes in (*a*) Water bound macadam surface, (*b*) Concrete road surface.

7. Give rate analysis of a door pannelled 2nd class with frame.

8. An R.C.C. Slab is being laid and you are asked to inspect it before concreting is laid. What points you would look for ? Write short note.

9. Write out the advantages and disadvantages of a Lemniscate curve.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

GUJARAT ZONE

Roads and Buildings with special reference to Modern Type of Road Construction

26TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Eight questions to be answered (4 out of 1 to 5 and 4 out of 6 to 10). Three marks are reserved for neatness and sketches.

Marks.

1. What is the difference between a culvert and a Bridge? When would you use a wing wall or a retaining wall? How would you determine the minimum length of a retaining wall? **10**

What is the prescribed spray of wings of culverts?

2. Define briefly :— **10**

(i) Bitumen, (ii) Asphalt, (iii) Road tar, (iv) Cutback asphalt, (v) Asphalt emulsion.

Name the various types of bituminous road constructions. Give specification for 2½″ full grout asphalt road construction.

3. What are the qualities required for metal for road resurfacing. **10**

How is the following determined? :—

(i) Hardness or ability to resist direct abrasion.

(ii) Toughness or ability to resist impact.

(iii) French co-efficient of wear.

(iv) Cementation test.

What is the metal mostly used for road resurfacing in your District and what are its co-efficient of hardness and toughness.

4. How would you make the cement concrete impermiable to the penetration of water during and after construction. Describe various methods. **10**

What is the initial and final setting times of and what is the weight of each per cu. ft. :—

(1) Ordinary cement.

(2) Rapid hardening cement.

5. Work out a rate analysis for 2½″ full grout and state what tools and plant and labour you would require if progress of 1 furlong per day is required (Road width 12′). **10**

6. What is guniting? Write specifications for ½″ cement plaster gunite. **8**

Marks.

7. Write specifications for Brick work 2nd Class. 8
Give sketches of alternate courses of 2½ Brick thick wall.

8. What is the task work for an experienced artisian or labourer per day for the following :— 8

Breaking trap metal 1½" to 2" size.

Scarifying or picking a road surface.

Excavation in soft Murum.

Brick work 2nd Class.

Course rubble 2nd sort.

9. Briefly describe the procedure of blasting rock with Dynamite and what precautions should be observed ? Explain what you would do if the hole charged with dynamite for blasting powder does not explode or misfire. 8

10. In case of R.C.C. Bridges having a Cement Concrete wearing coat, pot holes are formed within a couple of years. What do you think is the reason for those pot holes and what remedy you suggest for future guidance ? 8

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

General Engineering connected with Irrigation (Written)

25TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Solve any *eight* questions.
All questions carry equal marks.
Three marks reserved for neatness.

1. Write a brief note on " Lining of Irrigation Canals ".

2. Give specifications for any *three* of the following, with neat sketches wherever necessary :—

(*a*) Second Class Brick masonry in cement mortar.

(*b*) Drystone-Rubble pitching for an earthen dam.

(*c*) Rough cast cement plaster.

(*d*) Leak-proof cement concrete roof slab.

(*e*) Doors pannelled 2nd Class.

3. Design and sketch an R. C. C. Column with footings carry a load of 100 tons.

Permissible stresses :—

Concrete 600 lbs./sq. in.

Steel 16,000 lbs./sq. in.

M = 15.

Safe load on foundations 2 tons per sq. ft.

4. Explain in brief any *three* of the following, with neat sketches :—
(*a*) Wave Wash, (*b*) High Co-efficient Weir Crest, (*c*) Syphon-Spillway, (*d*) Super-passage, (*e*) Escape.

5. What do you understand by the term " Fineness Modulus method of proportioning aggregates " ? Explain how you would design a concrete mix using this method.

6. Explain with sketches the process of Lime Manufacture.

7. What are the types of foundations used for bridges ? Under what circumstances would you recommend each of the types ?

8. Earthwork in embankments can be paid either by cross-sectional measurements, or by borrow-pit measurements. Which do you advocate, and why ?

9. Explain with sketches what precautions you would take, if you have to found a building in an area where there is black cotton soil, upto a depth of 10 ft.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

GUJARAT ZONE

Irrigation and Irrigation Act (Written)

26TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Solve any *eight* questions. Question No. 1 is compulsory.
All questions carry equal marks.
Three marks reserved for neatness.

1. What do you understand by " Flood Absorption in Tanks " ? To what height will the floods rise in the case given below, allowing for flood absorption ?

Flood is of 10,000 cusecs lasting for 3 hours. Length of clear overfall weir is 400 ft. Areas of the tank at levels with respect to the crest of the weir are :—

0	18 M.Sft.
1 ft.	19·5 M.Sft.
2 ft.	21·0 M.Sft.
3 ft.	23·0 M.Sft.
4 ft.	26·0 M.Sft.
5 ft.	29·5 M.Sft.
6 ft.	33·5 M.Sft.

For what discharge will you design the tail channel ?

Or

Give an economical design for an acquaduct 50 ft. long to carry a 400 cusec canal with a motorable road.

2. How would you repair a fairly big breach in a canal bank when the canal is closed, or running ? (Give sketches).

3. What do you understand by the term " Duty " ?

What are the duties generally adopted for : Rice, Cotton, Kharif crops, Sugarcane, Follow-on Crops, Onions ?

4. Sketch typical cross-sections for a Canal in (i) Deep cutting, (ii) In High Bank, (iii) In Partial Cut and partial bank.

5. What does the term " CANAL " mean according to the Irrigation Act.

Or

Define : (i) Drainage works ; (ii) Owner ; (iii) Canal Officer.

6. An Irrigator desirous of constructing a new water course, through another man's land, being unable to do so by private negotiation, applies to the Canal Officer. Describe how such case would be dealt under the Irrigation Act.

7. What is a " Record of Rights " ? Who frames it ? What does it contain ?

8. How is land to be prepared for irrigation, and how are bunds to be constructed and maintained, as required by the Bombay Canal Rules ?

9. What are the obligations of Irrigators under a Second Class Irrigation Tank, under the Irrigation Act.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

GUJARAT ZONE

Accounts and Rules of the Public Works Department (Written)

26TH JUNE 1951

[11 A. M. TO 2 P.M.]

N.B.—Attempt any *eight* questions of which No. 1 is compulsory.

Marks.

1. Describe in detail the preparation and maintenance of Divisional Account. 12

2. You are posted in charge of a former State Engineer's office now converted into a Sub-divisional Office, and you have to submit your first monthly accounts. Describe what returns you would forward to the Divisional Officer and when ? 9

3. Define and distinguish any *six* of the following :— 9

(*a*) Completion report and completion certificate.
(*b*) Revised estimate, supplementary estimate and reduced estimate.
(*c*) Schedule of rate and extra item rate.
(*d*) Conveyance allowance and Travelling allowance.
(*e*) Draft budget and revised budget.
(*f*) Advance payment and secured advances.
(*g*) Store houses of Rest Houses.

Marks.

4. Describe the procedure to be followed for preparation of projects for original works (any *two*) of (i) Road, (ii) Buildings, (iii) Irrigation works. 9

5. What do you understand by the recognised systems of carrying out public works otherwise than by employment of daily labour and describe their several forms. 9

6. What do you understand by suspense account and when they are opened ? Describe in detail each of them. 9

7. What are the responsibilities of an Executive Engineer in respect of the following (describe in detail any *three*) :— 9

(1) Register of Buildings.
(2) Plans of Buildings.
(3) Road metal rate book.
(4) Schedule of rates.

8. Describe the procedure for issue of materials to the contractors when contracts contain a stipulation about the supply of materials by Department and those in which there is no such stipulation in the contracts. 9

9. What are the powers of— 9

(1) Chief Engineer.
(2) Superintending Engineer.
(3) Executive Engineer.

in respect of any *three* of the following :—

(*a*) Administrative approval and technical sanction, to estimates.
(*b*) Acceptance of Tenders.
(*c*) Excess over estimates. 75
(*d*) Disposal of stores.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

GUJARAT ZONE

General Engineering connected with Roads and Buildings (Oral)

JUNE 1951.

Marks.

1. Define :— 12

Weep hole.
Bulkage.
Shrinkage.
Bridging joist.
Water tables.

Marks.

2. How would you measure and pay — 12

(1) Painting Teakwood trellis work.

(2) Painting glazed doors.

(3) Portion of R. C. C. T-Beam, above the web and the level with slab. (Is it paid with the slab or the beam).

3. What are the different kinds of glasses available in the market ? 12

4. How much is the prescribed end and side laps ? At what intervals side bolts and end bolts are prescribed to be fixed ? 12

5. What is soundness of cement and how is it tested ? 12

6. (1) What is the recommended factor of safety of R. C. C. beam and slab ? 15

(2) What is the recommended factor of safety of stone beam ?

(3) How would you fix a detonator or blasting cap in blasting powder ?

(4) Why is salt recommended to be added to white washing lime ?

(5) What is the recommended Max. height upto which you would construct a dry stone retaining wall ? 75

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

GUJARAT ZONE

Roads and Building with special reference to Modern Type of Road Construction (Oral)

JUNE 1951

Marks.

1. What is meant by intensity of traffic as— 12

(1) Light, (2) Medium, (3) Heavy ?

What is the minimum vision required for.

(1) Horizontal curves.

(2) Vertical curves.

If minimum vision is not possible due to several reasons, what would you do ?

2. What is the minimum floor space required per head in case of— 12

(1) Schools ? (2) Hospital Wards ? (3) Office Accommodation ? (4) Hostels ?

3. Name the tools used in the finishing process of cement concrete roadway. 15

4. What is Ribbon Development ? What are the prescribed margins or limits for various roads in urban and rural areas ? 12

Marks.

5. Describe briefly the process of carrying out surface dressing with 50 lbs. asphalt. 12

6. How many categories of road signs there are and how are they characterized. 12

Some road signs have a triangular board on top and some have a circular. Why ?

At what distance the road signs should be erected ?

75

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

GUJARAT ZONE

General Engineering connected with Irrigation (Oral)

JUNE 1951

Marks.

1. What do you understand by— 12

(*a*) Weep-holes.
(*b*) Dead-man.
(*c*) Jack-rafter.
(*d*) King-closer and Queen-closer.

2. What out-turn would you consider reasonable for an artesian for— 12

(*a*) Brickwork in 9 inch walls.
(*b*) White-washing 2 coats.
(*c*) Mangalore-tile covering.
(*d*) Breaking metal 1½ inch size (trap).

3. What is weight of— 12

(*a*) Trap metal per c.ft.
(*b*) Cement concrete per c.ft.
(*c*) Mangalore tile (dry) each.
(*d*) A. C. Sheets as laid, per s.ft.
(*e*) C. G. I. Sheet 24 Guage per s.ft.
(*f*) Teak wood per c.ft.

4. What is the difference between "Fat Lime" and "Hydraulic Lime". Where do you use each ? Can you make Fat Lime Hydraulic ? How ? 12

Marks.

5. What period would you allow before striking shuttering for (*a*) with Ordinary Cement, (*b*) with Rapid Hardening Cement ? 12

(i) Slabs.

(ii) Sides of beams.

(iii) Beam props.

6. What do you understand by 'slump' in concrete ? What slump will you recommend for— 15

(*a*) R. C. C. in beams.

(*b*) Mass Concrete in foundations.

(*c*) Vibrated concrete in Road slabs.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

GUJARAT ZONE

Irrigation and Irrigation Act (Oral)

JUNE 1951

Marks.

1. What do you understand by— 15

(1) Bhandhara.

(2) Semi-module.

(3) Capacity Factor.

(4) Delta.

(5) Acre-foot. How many acre feet, make 1 Mc. ft. ?

2. What are the Irrigation seasons in Gujarat ? Why and how do they differ from those in Deccan ? 12

3. What is average depth of water required for matuting one acre of— 12

(1) Rice, (2) Sugar-cane, (3) Wheat, (4) Onions, (5) Tumeric.

4. What do you understand by— 12

(1) Blocks, (2) Block Rate, (3) Pass, (4) Two-season Crop, (5) Plot.

5. What is a Panchnama ? When is made ? By whom ? 12

6. What charges are imposed when water supplied through a water course is allowed to run to waste ? 12

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

GUJARAT ZONE

Accounts and Rules of the P. W. Department (Oral)

27TH JUNE 1951

Marks.

1. What are the duties of Divisional Accountant ? **12**

2. Enumerate the forms of Bills and vouchers in the P. W. D. **12**

3. What do you understand by sanction to estimate ? When does it lapse ? **12**

4. What is a working estimate ? When is it prepared ? **12**

5. What are the Powers of Chief Engineer, Superintending Engineer and Executive Engineer for— **12**

(1) Sale or demolition of Buildings.

(2) Write off irrecoverable value of Stores and losses of public money.

6. In addition to the main returns, what other account returns are submitted by the Sub-divisional Officer— **15**

(1) Monthly.
(2) Half-yearly.
(3) Yearly.
(4) Occasional.

75

PROFESSIONAL EXAMINATION OF OFFICERS OF THE B. S. E., CLASS I

ROADS II

Deccan Irrigation Circle, Roads and Buildings (Written)

25TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Answer any ten questions.

1. Write short notes on :—

(*a*) Artificial Hydraulic Lime.
(*b*) Lime Pointing.
(*c*) Aqua Privy.
(*d*) Brick Nogging.
(*e*) Damp Proof Course.

2. Give safe permissible loads over—

(1) Black Cotton Soil.
(2) Soft Clay.
(3) Hard Murum.
(4) Hard Rock.

Explain different methods with sketches for laying foundations in Black Cotton Soil.

3. Give specifications for Coursed Rubble Masonry Second Sort. Explain the points you would specially notice while inspecting the work.

4. Give specifications and Rate Abstract for polished shahabad flooring ; what bedding is required for this type of flooring.

Or

Explain briefly different Types of flooring and places where you would recommend each giving briefly reasons for the same ; give approximate comparative cost of each Type you mention.

5. Explain different methods of making roof water-proof. What special precautions are necessary while giving this treatment and preventing damage to the walls.

Give rough cost of each Type.

6. A water bound Road is being badly damaged by a heavy Motor Traffic. What immediate steps would you take to meet the traffic demand ? How would you improve the surface according to the intensity of traffic and state roughly cost likely to be involved for different proposals.

7. Explain with sketches standard Section of a National Highway or a Provincial Highway passing through Towns and the Country. What surface would you recommend for different intensities of traffic ?

8. Explain the measures required to be adopted for protecting the Road Surface and Cross Drainage works before and after the Monsoon.

9. Give brief Specification for 5″ thick cement concrete Road Surface 20 feet wide. Explain the special precautions for preparing the sub-grade.

10. Explain the following :—

(Wherever possible with sketches)

(*a*) Camber and Superstructure.
(*b*) Liquid Seal Coat.
(*c*) Formation of a Road.
(*d*) Ruling Gradient.
(*e*) Catch Water Gutter and Catch Pit.

11. Give detailed instructions for Reconditioning very badly damaged Water Bound Surface. What Special instructions would you like to give in this connection ? Give final Cross Section that should be adopted for Provincial Highway with 1,200 tons per day traffic.

12. Explain different kinds of Road Surfaces proposed for the present for Modernising the road surface according to the intensity of traffic. Mention roughly cost required per mile for each Type, includig finishing of side widths for a National Highway or a Provincial Highway.

13. Give detailed specifications with a Cross Section for 3″ full grout Asphalt Macadam Surface including reconditioning, the sub-grade. Under what circumstances would you adopt this surface ?

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

DECCAN IRRIGATION CIRCLE

Design and Construction of Earthen Dams (Written)

25TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Answer any *ten* questions. All questions carry equal marks. Total marks 75.

1. What are the different methods of slope protection for an Earthen Dam ? State the peculiar conditions where each will be most suitable. Indicate the design principles.

2. Enumerate the main criteria for the design of an Earthen Dam.

3. Draw the hydraulic gradient and the flow net for an earthen dam with the following data and calculate the seepage losses in a 1,000 ft. :—

(1) Top width of earth section 15 ft. ;

(2) Upstream slope 3 : 1 ;

(3) Downstream slope $2\frac{1}{2}$: 1 ;

(4) Upstream protection 2'-0" dumped rubble on 6" of metal outside the earth section ;

(5) Dam of one material only *i.e.*, silty clay of permeability co-efficient $= \cdot 2 \times 10^{-6}$ Cm. per second per unit gradient ; assumed to be uniform in the section.

(6) Foundation is of exposed impervious rock ;

(7) Downstream one third to have a 5' thick highly pervious gravel filte flat on foundation rock.

4. What do you understand by 'Zoning' in an Earthen Dam ? What are the principles adopted in its design and in what respect is a Zoned dam better than one without specific Zones ?

5. What is a Rock-fill Dam ? Where can it be most suitably adopted ? Give specifications for the rock-fill.

6. Write short notes on the following :—

(*a*) Shrinkage limit ;

(*b*) Shrinkage Ratio ;

(*c*) Pore pressure ;

(*d*) Pressure cells ;

(*e*) Penetration resistance.

7. State how you will design the cut-off trench and the drainage trenches of an earthen dam founded on exposed soft murum. Give specifications for the drainage trenches.

8. What is a filter well ? What are the criteria for its design ? Under what conditions is it adopted ?

9. Work out the rate analysis for the following assuming mechanisation wherever possible :—

(1) Embankment in soft and hard murum lead 2,000 ft. lift 30 ft. compaction 95% of *A A S H O* test.

(2) Crushed stone filter below rock—rip-rap.

(3) Cost per day of operating a 10 ton steam roller on an embankment.

10. Comment on the following quotations from the P. W. D. Hand Book in view of the modern knowledge of soils and earth dams :—

(*a*) " No watering (for an embankment) shall be allowed until the layer is completely rolled " ;

(*b*) " Clay is to be worked up into puddle before use by turning it over and over again with phaoras watering and trodding it with men's feet into one plastic homogeneous mass of the toughest consistancy ".

(*c*) " Pure Black Soil should not be used for embankment except in combination with some foreign material such as murum or sand "

11. State what physical properties of soils can be inferred by knowing the following values for a soil :—

(*a*) Liquid Limit ;
(*b*) Plasticity Index ;
(*c*) Coefficient of consolidation ;
(*d*) Angle of internal friction.

Give values *a*, *b* and *d* for any type of soil with which you are acquainted.

12. What is the Vicksburg criterian for filter design ? What will happen if you do not adhere to it ? Illustrate where this knowledge can be useful to you.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

DECCAN IRRIGATION CIRCLE

General Engineering connected with Design and Construction of Earthen Dams (Written)

25TH JUNE 1951.

[11 A.M. TO 2 P.M.]

N.B.—Answer any *ten* questions.
All questions carry equal marks.
Total marks 75.

1. State the design criteria for the following types of waste weir and explain under what conditions they will be useful and economical :—

(*a*) Channel spillway ;
(*b*) High coefficient wall with clear overflow ;
(*c*) Gated weir.

2. A larger number of earthen dams are under construction in the world at present, as compared to masonry or concrete dams. How do you explain this on technical, economical and social grounds ?

3. You have to pour cement for a concrete waste weir wall of an earthen dam. State how you will obtain a water tight and strong cement concrete. What water cement ratio and what slump will you specify.

4. How will you decide whether a soil will be suitable for use on an earthen dam ? State what you consider the best use for the soil of the following properties :—

Premeability 53 ft./year.

Dry Density under *A A S H O* test 120 lbs./ c.ft.

Optimum moisture 12%.

Plasticity Index 12.

5. Write short notes on the following :—

(1) Piping ;

(2) Pile cut-off ;

(3) Clay blanket ;

(4) Quick draw-down failure.

6. What is the Swedish Circle stability analysis ? What factors of safety would you consider adequate for an 80' earth dam on murum foundation ?

7. It is stated that maximum number of failures of earthen dams have taken place due to inadequate provision of waste weirs. State how will you proceed to ensure that such a failure will not occur ?

8. What precautions will you take to see that no casualty occurs in a blasting operation on a work where High Explosives and fuse detonators are used ?

9. Describe with sketches a lime kiln. State the requirements of fuel and work out rate analysis for slaked lime.

10. Distinguish between shear failure and settlement failure of a masonry structure on soil foundation. How can they be prevented ?

11. Write specifications for the following :—

(1) Teak wood needles ;

(2) Fine dressed cut stone work ;

(3) Dry stone rivetment.

12. Describe with setches different types of stone pitching for earth dams.

PROFESSIONAL EXAMINATION OF OFFICERS OF THE B. S. E., CLASS I

DECCAN IRRIGATION CIRCLE

General Engineering (Roads and Buildings) (Written)

25TH JUNE 1951

[11 A.M. TO 2 P.M.]

N.B.—Answer any *ten* questions.

1. Write short notes on and explain with sketches—
   (*a*) R. C. C. Raft.
   (*b*) Framed Structure.
   (*c*) Inverted Arch Construction.

2. Give details of manufacturing Hollow or Solid Cement Concrete Blocks and Specifications for using them in masonry.

Or

Explain in detail method of Manufacturing First Class Bricks.

3. Give Specifications and Rate Abstract for Ashlar Block in Course Masonry *or* Rough Cast Cement Concrete Plastering.

4. Explain with Sketches main principles to be observed in designing a class room for 40 students.

Or

A small three-room self-contained tenement with all necessary services.

5. Design and explain with Sketches 20′ Culvert with Rise 1/5 for a National Highway assuming suitable data.

Or

Design a roof slab for a Hall 40′ × 100′ assuming suitable data for beams, oads, etc.

6. Give Specifications and Quantities required per 100 Sft. of Roadway for Road Metal used in your Division for :—
   (*a*) Water Bound Macadam 3″ thick.
   (*b*) Asphalt Macadam 2½″ thick.
   (*c*) Cement Concrete Slab 5″ thick.

Mention the approximate rates at which different kinds of metal are available in you Division.

7. Mention the measures you would adopt in ensuring safety of heavy Motor Traffic on steep narrow Ghat portion and to bring the road to the Standard of a Provincial Highway.

Explain the priority you would adopt in carrying out different measures considered necessary.

8. Explain what is meant by surface. dressing. Give specifications and approximate cost per mile with Rate Abstract.

9. Mention relative advantages of premixed and penetration methods of asphalt macadam surface and where you would recommend each type. Mention the general policy at present adopted for determining (*a*) width and (*b*) thickness of asphalt or concrete modernised surfaces to suit the intensity of traffic.

10. Explain the following :—

(*a*) Rough Cast Cement Plaster.

(*b*) Jack Arch Construction.

(*c*) China Mosaic Flooring.

(*d*) Slump Test for Cement Concrete.

11. Design 10 feet Diameter Well for a Village. Assume Depth of Well 25 feet in Soft Soil, Hard Murum and other suitable strata.

Explain with suitable sketches dimensions you adopt for such a construction.

Give rough Estimate of the work.

12. Design a Retaining Wall for supporting the Roadway in a side long Ghat portion. Assume height of wall as 15 feet. Mention precautions for securing proper drainage and safety of Traffic.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

DECCAN IRRIGATION CIRCLE

Construction of Earth Dam (Oral)

JUNE 1951

N.B.—All questions carry equal marks.

Total Marks 75.

1. Describe the method of Density Control on an earthen embankment.

2. State what laid indensities you will specify for the following :—

(*a*) River gravel.

(*b*) Soft murum.

(*c*) Silty clay.

(*d*) " Brown soil " as defined in the Bombay P. W. D. Hand Book.

3. What are the various methods for unwatering and excavating a deep cut in soil for foundations of a dam ? State the particular adoptibility of each of the methods.

4. A river has a 150 feet deposit of clean quartzite sand. Can you design a 60' high dam at this site ? What sort of failure is likely and how will you protect against it ?

5. Is there any rational way to find out what provision should be made against the settlement of a Dam and its foundations ? How will you find it ?

6. What is the Proctor's contribution to the science of soil compaction ? What outfit do you need to carry out the Proctor's tests ?

7. Give brief information about the following :—
   (1) Well point pumping ;
   (2) Sump pump ;
   (3) Submersible pump ;
   (4) Self Priming pump ;
   (5) Mud pump ;
   (6) Sand pump.

8. What are the prevailing rates in your District for the following :—
   (1) Supply of river Gravel ; Lead 600 feet ; Lift 30 feet ;
   (2) C. R. masonry 2nd sort in 1 : 6 cement mortor ;
   (3) Supplying and laying 6" diameter drainage pipe line ;
   (4) Preparing Pre-cast stones for outlet arch.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I

DECCAN IRRIGATION CIRCLE

General Engineering connected with Design and Construction of Earth Dams (Oral)

26TH JUNE 1951

N.B.—All questions carry equal marks.

Total marks 75.

1. What is guniting ? What are its particular uses ? What precautions are necessary to obtain good work ?

2. What is grouting ? What are the different types of grouting in rock ? Under what conditions are they specified ?

3. (*a*) What is the task work per hour for a 40 lbs. jack hammer drilling in blue basalt ?

(*b*) What is the task work per hour for a steam Road Roller consolidating an embankment ?

(*c*) How many trips per day will a 3 Ton Truck make for an earth work job on which excavation loading and unloading is done manually ? Assume lead one furlong, and lift 10 ft.

4. What do you understand by the following :—

(1) Shear resistance of a soil ;

(2) Atterbery's limits ;

(3) Mechanical analysis.

5. What are the principal contributions of soil Mechanics to the design and construction of Earth Dams ?

6. How will you draw the seepage line through an embankment ?

7. It is stated that hypothetically an Earth Dam can be constructed with almost any materials and on any foundations. Comment on the statement.

8. What are the different types of drainage arrangements for an Earth Dam ; and under which conditions each of the types can be most suitably employed ?

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

DECCAN IRRIGATION CIRCLE

Accounts and Rules of P. W. D. (Oral)

26TH JUNE 1951

N.B.—All questions carry equal marks.

Total marks 75.

1. Give information in brief on any *three* of the following :—

(*a*) Contractor's ledger ;

(*b*) Book transfer ;

(*c*) Budget estimates ;

(*d*) Loan works ;

(*e*) Issue rate of stock ;

(*f*) On-account payment.

2. Explain—

(*a*) Revised Estimate ;

(*b*) Supplementary Estimate ; and

(*c*) Work-slip ;

d state when is each necessary.

3. Distinguish between original and Repair work and illustrate by giving amples.

4. State what details are incorporated in a work abstract of a Major ork ?- From what documents is it prepared and what purpose does it serve ?

5. What is the utility of the Purchase Account Register ? In what parts is it maintained ? How are entries made and watched ?

6. State the procedure to be adopted to account for the cash received on behalf of Government by a subordinate. What precautions are necessary to avoid misappropriation ?

7. State what penalties can be enforced on a Contractor for a work on a B-2 tender if he—

(i) fails to start the work on the date he is asked to start ;

(ii) fails to maintain requisite progress ;

(iii) fails to complete the work in time.

8. What is cash ? What precautions are necessary for its safety ? How is the cash obtained from Treasury for (i) Labour Payment, (2) Payment of the salary of a subordinate and (3) Payment to a work-charged Road Karkun ?

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E., CLASS I

DECCAN IRRIGATION CIRCLE

Roads and Buildings (Oral)

JUNE 1951

1. (*a*) What are the characteristics of a good timber ?

(*b*) What causes decay in timber ? How it is preserved ?

(*c*) Mention kinds of timber used for (1) Building Work ; (2) Furniture ; (3) Boat Building.

2. Mention safe permissible loads on :—

(1) Ashlar Masonry (trap).
(2) Ashlar lime stone.
(3) Cement Concrete 1: 2 : 4.
(4) Cement Concrete 1 : $1\frac{1}{2}$: 3.

3. Mention Building Regulations regarding the widths of walls for the following structures :—

Heights of structures.

(i) 10′, (ii) 25′ to 30′, (iii) 50 to 60 feet.

4. Mention rates for the following items :—

(*a*) Cement Plaster $\frac{3}{4}$″ thick.

(*b*) Cement Concrete 1 : 2 : 4.

(*c*) Ashlar Masonry Trap.

(*d*) Providing and fixing Wash-Hand Basin 18″ or 15′

(*e*) Cement Concrete Block Masonry Hollow or solid or 1st Class Brick Masonry (lift 40′).

5. Explain the following :—

(1) Berms and how they are maintained.

(2) Corrugation of surface.

(3) Traffic statistics.

(4) Premixed Carpet.

(5) Colas Macadam Surface.

6. Describe the points you have specially to observe in providing 2" thick full grout asphalt macadam surface including reconditioning.

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E., CLASS I

DECCAN IRRIGATION CIRCLE

General Engineering—Roads and Buildings (Oral)

26TH JUNE 1951

[1 P.M. TO 6 P.M.]

1. How do you pass foundations of a Building 60' high ; A Bridge 40' span.

What bearing pressure you would allow for (1) Hard Rock, (2) Sand, (3) Black Soil.

2. A R.C.C. roof is badly leaking. Explain the method you would adopt in repairing it and approximate cost of the measure you would propose.

3. Explain briefly the method of varnishing, painting and finishing wood work with french polish or oiling. Give approximate costs of each type of work.

4. Discuss the advantages of Corrugated G. I. Sheet Roofing and Asbestos Sheet roofing and when you would recommend each type ? What measures y would adopt in keeping rooms cool under these roofs ?

5. State what factors govern safe permissible loads on roads ? What are the present limits ? To what extent are these limits required to be increased ? How you propose to cope up with the ever increasing traffic ?

6. (*a*) Compare the cost of Cement Concrete road surface with that of Asphalted surface to bear the same intensity of traffic and under identically similar conditions.

(*b*) Explain the principle of keeping joints in concrete Road Surface.

7. Explain :—

(*a*) Correct method of providing steps.

(*b*) Providing roof gutter for a saw toothed Factory.

(*c*) Protecting toe of dry revetment or pitching.

8. Give the rates of the following :—

(1) Road Metal $1\frac{1}{2}''$ to $2''$.

(2) Trap Metal $1''$ to $\frac{3}{4}''$.

(3) $2\frac{1}{2}''$ semi-grout asphalt Macadam.

(4) Two Coats of Liquid Seal Coat.

(5) Resurfacing 1 mile Water Bound Macadam $3''$ thick.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I

DECCAN IRRIGATION CIRCLE

Accounts and Rules of P. W D. (Written)

26TH JUNE 1951

[11 A.M. TO 2 P.M.]

Total marks 75.

N.B.—Answer any *ten* questions.

All questions carry equal marks.

1. State the special points of mention while making entries of the following transactions in your Cash Book :—

(*a*) When you take money from your chest at head quarters for payment to labour and piece workers at out-stations ;

(*b*) On your return to head quarters after making payment to labour ;

(*c*) When cash is found surplus or short in the chest ;

(*d*) When you give imprest and when you increase or decrease it.

2. Explain the following terms and state in what particular respect they differ from each other :—

(*a*) First and Final payment ;
(*b*) Running Account Payment ;
(*c*) Secured Advance Payment ;
(*d*) Final Bill Payment.

Give the powers of payment in each case of a Class I—Assistant Engineer acting as a Sub-Divisional Officer.

3. What is " Reserve Stock " and where would you consider maintaining such account necessary ? State the form Nos. in which the stock account is maintained, giving details of each of the forms.

4. How will you account for the following transactions in the T. and P. forms 13, 14 and 15 ? :—

(*a*) 20 tons of cement is given on loan to another Sub-Division ;

(*b*) A pump is sent for repairs to the Dapuri Workshop ;

(*c*) 10 Crow bars are reported to you as short by your Overseer, but further investigations are going on ;

(*d*) Five out of the 10 crow bars are found and the remaining 5 are lost for which recovery at half the cost is ordered.

5. State the different systems of carrying out works and comment on the limit and the advantages and disadvantages of each.

State the system you will prefer for a Special Repairs work of road resurfacing.

6. Write short notes on the following :–

(*a*) Major and Minor works ;

(*b*) Sub-Works and Sub-Heads ;

(*c*) Direct and Indirect charges ;

(*d*) Revised and Supplementary Estimates.

7. Define the following :—

Earned leave ;

Commuted leave ;

Substantive pay.

What is the rate of daily allowance for the following :–

(*a*) A Class II Officer getting Rs. 350 p.m. ;

(*b*) A Class IV servant ;

(*c*) An Overseer getting Rs. 150 p.m.

8. There has been a breach on the canal in your charge. What action will you take from the administrative and the accounts point of view from the starting of the work to its completion ?

9. What is Secured Advance and under what conditions and to what extent is it given ? On what articles its grant is prohibited ?

10. Write short notes on :—

T. E. O. ;

Work abstract ;

Petty cash book ;

Manufacturing account ;

Advice of Transfer Debit ;

R. T. R.

11. (*a*) State the points to which you will give special attention while examining the Register of Major Works.

(*b*) When is it necessary to maintain material at site account ? State the care you would take to clear such account before a work is closed.

12. You are asked to carry out departmentally a two storied Building. List the important materials. Indicate your powers of purchase and state exactly the procedure to be followed to procure the articles beyond your own power of purchase.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

General Engineering connected with Roads and Buildings (Written)

25TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Answer any *eight* questions.

Three marks are reserved for neatness and sketches.

Each question carries *nine* marks.

1. Give names of 3 trees which are raised by long cuttings.

Give names of 3 trees which are raised by short cuttings.

What should be the desirable height or growth of a plant in a nursery before it is transplanted on roadside.

Describe various types of tree guards.

2. There is shortage of ferro-paper, however necessary chemicals are available. Please name the chemicals required and write out instructions how the sensitized paper be prepared and used.

3. What is the size of Mangalore roofing tile ? How many tiles are required to cover 100 sq. ft. of roof area ? What is the weight of each tile ?

At what intervals battens are fixed for mangalore tiles ? How many mangalore roofing tiles come in one Railway wagon (broad gauge).

4. Give specification of a window, iron barred with glazed and plank shutters. Give a sketch of a window $3\frac{1}{2}' \times 4\frac{1}{2}'$.

5. What are the various types of wooden roof trusses used in this Presidency. Give a sketch of a joint in the wooden tie beam of a king or queen post truss.

6. Give quantities of materials required for :—

(1) Brick nogging 100 sq. ft. ;

(2) Distempering 1 coat 100 sq. ft. ;

(3) Cement concrete 1 : $1\frac{1}{2}$; 3—100 cub. ft. ;

(4) Painting 2 coats on old iron girders 100 sq. ft. ;

(5) Varnishing 2 coats—100 sq. ft.

7. Give rate analysis of a window iron barred with glazed and plank shutters.

8. Write out full instructions to your subordinate what he should attend to on a Ghat Road before, during and after monsoon.

9. What is the task work for an experienced artisan or labourer per day for the following :—

(1) Brick work 2nd Class ;

(2) Coursed rubble 2nd Class ;

(3) Stone paving 2nd short ;

(4) Plank ceiling ;

(5) Fixing roof battons for country tiles ;

(6) White washing 1 coat ;

(7) Painting 1 coat ;

(8) Scraping old paint.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

Roads and Buildings with special reference to Modern Type of Road Construction

26TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Answer any *four* out of questions Nos. 1 to 5 and any *four* out of questions Nos. 6 to 10.

Marks.

1. (*a*) Briefly describe, the procedure of blasting rock with blasting powder and what precautions should be observed ? 10

(*b*) Which metal rod, would you prefer for tamping dynamite charge.

Marks.

2. (*a*) Define briefly :— 10

(1) Bitumen.

(2) Asphalt.

(3) Road tar.

(4) Cut-back asphalt.

(5) Asphalt emulsion.

(*b*) Name the various types of asphalt road constructions.

(*c*) Give specification for a surface dressing with 50 lbs. asphalt.

3. Work out a rate analysis for a surface dressing with 50 lbs. asphalt and state what tools, plant and labour you would require if progress of 1 furlong per day is required (Road width 12′). 10

4. Explain the following :— 10

(1) Camber.

(2) Cross fall.

(3) Water Table.

(4) Plastinity index.

(5) Stabilized earth road.

(6) Cementation test.

5. Give names of tools with sketches required for a cement concrete road construction. 10

6. What is the task work for an experienced artisan or labourer per day for the following :— 8

(1) Cement pointing to brickwork.

(2) Lime plaster 2 coats.

(3) Excavation in hard Murum.

(4) Breaking latenite metal 3″ to 4″ size.

(5) Conveying metal by head load lead 660′.

7. Explain with sketches, the various methods of securing the toe of pitching against slipping. 8

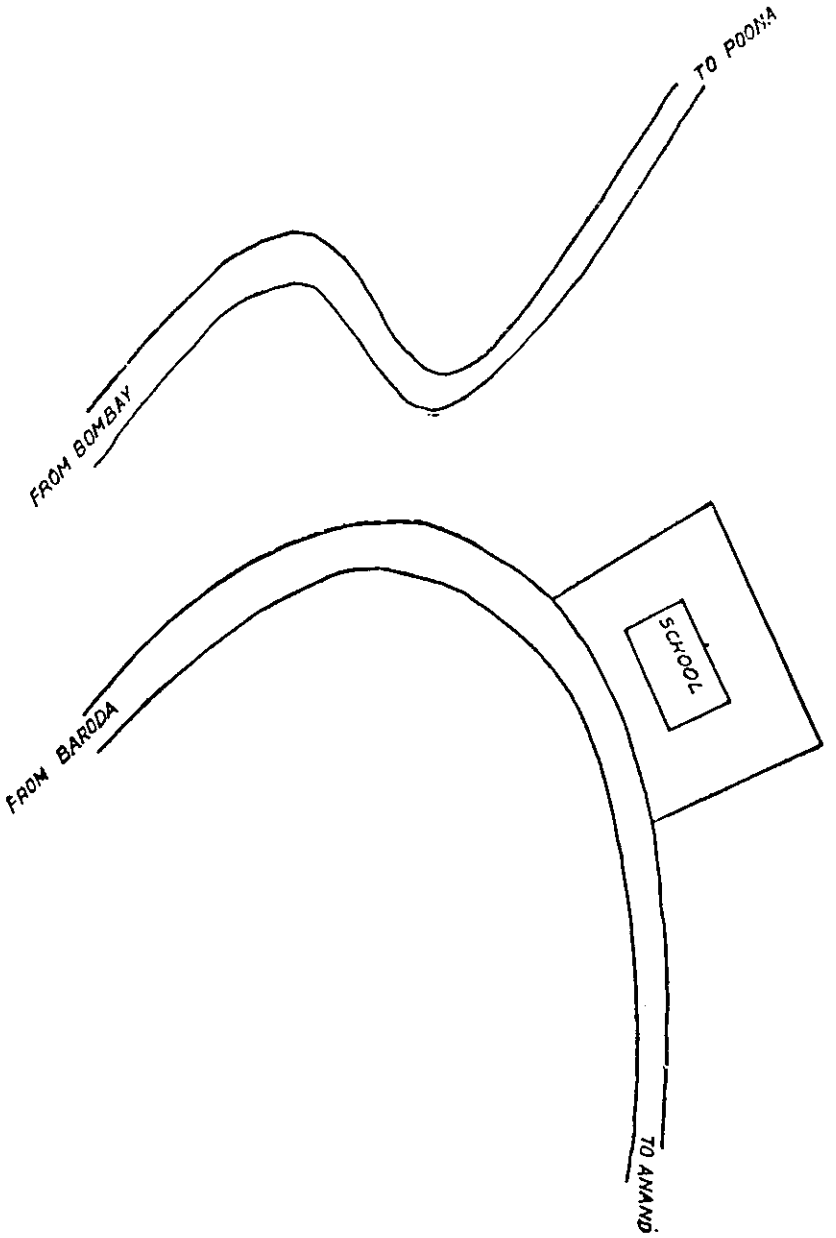
8. Write specification of "Dry rubble stone Retaining Wall". 8

Marks.

9. Give detailed instructions to your subordinates, how cement rendering be carried out. 8

10. How many categories of road signs there are and how are they characterized ? 8

Give illustrations of road signs required in case of following and show where you would erect them.



PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

General Engineering connected with Sanitary Engineering (Written)

25TH JUNE 1951

[2 P.M. TO 5 P.M.]

(Total marks 75. *Three* marks reserved for neatness.)

Marks.

1. Describe the operations of sinking a Jach Well 16 ft. dia. and 60 ft. deep. Sub-soil water is met at 45 ft. below ground level. What type of Pumping machinery you would use for dewatering the well ? Draw a sketch to show the curb you would use. **9**

2. Design an R.C.C. Roof slab supported on R.C.C. *Columns* 10 ft. apart for an underground pure water reservoir 100′ × 120′ × 11′, 4 ft. below ground level the top cover consisting of ordinary alluvial soil. (Area of bars $\frac{3}{8}$″-0·11, $\frac{1}{2}$″-0·196 and $\frac{5}{8}$″-0·307 sq. ins.). **12**

3. What do you understand by an Acqua privy and where it could be advantegeously used. Draw a dimensioned sketch showing one seated Acqua privy. **9**

4. Write short notes on the following :— **12**

   (1) Chloramine treatment of water.

   (2) Porous pipe gallery.

   (3) Elevated service reservoir.

   (4) Hydraulic gradient in a rising main.

5. Draw a dimensioned sketch for an Engine House with a Jack well 20 ft. dia. in the centre for housing two pumping sets 360 H.P. one oil engine driven and the other Electrically driven on the bank of a river. **10**

   Chlorination and Gantry arrangements and details of the rising main from the pump delivery be shown on the sketch.

6. Write out detail specifications for laying a 6″ S. W. Drainage pipe line ten ft. below ground in average alluvial soil. How do you test the line for water tightness ? **7**

7. What do you understand by a lightening conductor ? Sketch arrangements for providing such conductor for a R.C.C. High Service reservoir 70 ft. high. **7**

8. What arrangements are provided for inspection, ventilation and cleansing of public sewers ? What precautions are taken for the safety of the persons engaged on cleaning work ? **6**

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

Sanitary Engineering (Written)

26TH JUNE 1951

[3 P.M. TO 6 P.M.]

(*Three* marks reserved for neatness. Total marks 75.)

Marks.

1. Describe the Sanitary and Hygienic requirements for the designing and construction of school buildings. What floor space you would specify for the following :— **9**

(*a*) Hospitals, (*b*) Residential Bungalows.

2. State the various types of pipes used in a sewerage system giving their respective advantages and disadvantages. What factors govern the determination of the sizes of the pipes. What is meant by an Ovoid Sewer and where is it used. **9**

3. Describe any *three* of the following with sketches :— **9**

(1) Flushing tank.
(2) Percolating filter with automatic sprinkler arrangement.
(3) Water closet showing connections to the main sewer.
(4) Storm water overflow.
(5) Sewer Junction manhole 9 ft. deep.

4. What are the different methods of sewage disposal in large towns and villages in the Bombay State. **10**

Design a sewage disposal scheme for a town of two lakhs population with water supply at 30 gallons per head.

5. Describe the physical properties of good drinking water. What standards are adopted for potable drinking water as regards chemical composition and bacteriological count ? **9**

6. It is proposed to provide mechanical rapid gravity filters for water supply to a town with two lakhs population at a rate of 30 gallons supply of water. Draw a section of the purification plant showing levels at different stages. **10**

Compare slow sand with rapid gravity filters.

7. Write out a short preliminary note on a water supply scheme for town of 60,000 souls assuming 20 gallons, per head supply. **8**

The source of water is a river two miles away and the town is situated at the same level of the bank, of the river.

State the financial aspects of the scheme based on existing Government orders.

8. Explain any *four* of the following :— **8**

(1) Ph. value. (2) Total hardness of water. (3) Artesian bore well. (4) Run-off. (5) Reflux valve.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

General Engineering connected with Irrigation (Written)

25TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Try any *eight* questions.
All questions carry equal marks.
Three marks reserved for neatness.

1. Write a brief note on "Modern methods of rock excavation in open trenches".

Or

Write a brief note on "Modern methods of Construction of Earthen Dams."

2. Give specifications for any *three* of the following with neat sketches wherever necessary :—

(*a*) Brickwork 2nd class in mudmortar.
(*b*) Drystone Bubblepitching for banks.
(*c*) Soil-cement floors.
(*d*) Doors plain planked.
(*e*) Mangalore Tiled-roofing.

3. Design and sketch a simply supported R.C.C. slab 10 ft. span to carry a super imposed load on 40 lbs. per sq. foot, and a knife edge load of ½ ton.

(*Assume your stresses.*)

4. Explain in brief with sketches any *three* of the following :—

(*a*) Wave Wash, (*b*) Water Cushion, (*c*) Standing Wave, (*d*) Acquaduct, (*e*) Escape.

5. What do you understand by the term "Fineness modules method of proportioning aggregates ?

6. Explain with sketches the process of Brick Manufacture in open kilns.

7. Design and sketch a culvert to carry a canal 16 ft. wide with 4 ft. of water, over a nalla having a catchment area of 200 acres.

8. What load would you allow on,

(*a*) Black cotton soil.
(*b*) Hard Murum.
(*c*) Brick in cement mortar.
(*d*) Mass concrete 1 : 6.
(*e*) Cement concrete 1 : 2 : 4.
(*f*) Dry Clay compacted.

9. What types of outlets are generally used for small Irrigation tanks ? Draw neat sketches to illustrate your answers. Which would you prefer and why ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

Irrigation and Irrigation Act

26TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Solve any *eight* questions.
All questions carry equal marks.
Three marks reserved for neatness.

1. Design and draw a free-overfall Waste weir with a water cushion to pass a flood of 10,000 cusecs, limiting the flood depth to 4 ft. above the crest.

2. Write Brief Notes on any *three* of the following :—

(i) Modules.

(ii) Flumes.

(iii) Co-efficient of Rugosity. What is its value for concrete, weedy river beds ?

(iv) Silting of canals.

(v) Bossy type irrigation.

3. What do you understand by the term "DUTY" ? What are the duties generally adopted for RICE, Cotton, Sugar-Cane, Onions, Wheat ?

4. How is the discharge in Rivers Measured ?

Which method would you prefer ? and under what circumstances ?

5. What does the term "CANAL" mean according to the Irrigation Act ?

6. Define (i) Drainage Work, (ii) Owner, (iii) Canal Officer.

7. What are the obligations of owners of water courses under the Irrigation Act ?

8. What offences, under the Irrigation Act, are punishable with a fine which may extend to rupees 200, or with imprisonment for a term which may extend to six months or with both ?

9. What is the water rate chargeable when well water and canal water are conveyed in the same channel ?

10. What points would you attend to during the inspection of your canal,

(*a*) before monsoons, (*b*) during the irrigation season, (*c*) after the irrigation season.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

Accounts and Rules of the Public Works Department (Written)

26TH JUNE 1951

[9 A.M. TO 2 P.M.]

N.B.—Attempt any *eight* questions of which question No. 1 is compulsory.

Marks.

1. Describe in detail the preparation and maintenance of Sub-divisional Accounts. 12

2. You are posted in charge of a former State Engineer's office, now converted into a Sub-divisional Office, and you have to submit your first monthly account, describe what returns you would forward to the Divisional Office and when ? 9

3. Define and distinguish any (*six*) 6 of the following :— 9

(*a*) Cash book and Imprest account.
(*b*) Muster roll and Aquittance roll.
(*c*) Duplicate and Triplicate receipt works.
(*d*) Work abstract and abstract of charges.
(*e*) Sub-head and sub-work.
(*f*) Issue rate and market rate.
(*g*) Store Houses and Rest Houses.

4. Describe the procedure to be followed for preparation of projects for original work and repair work of Civil Buildings. 9

5. Enumerate and describe the Deposit transactions of the P. W. D. 9

6. What do you understand by Daily labour ? Describe the procedure for their employment, payment and accounting therefor. 9

7. What are responsibilities of the Sub-divisional Officer in respect of any *three* of the following :— 9

(1) Daily reports.
(2) Masonry register.
(3) Sub-divisional Stores.
(4) Road metal returns.

8. Describe the procedure for issue of materials to contractor whose contracts contain a stipulation about the supply of materials by Department and those in which there is no such stipulation in the contracts. 9

Marks.

9. What are the powers of— 9

(1) Executive Engineer

and

(2) Sub-divisional Officer

in respect of any *three* of the following :—

(1) Sanction of estimates, (2) Acceptance of tender, (3) Payment of bills, (4) Sanction of leave to work-charged establishment.

75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

Practical Test

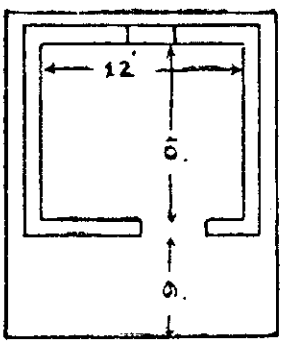
27TH JUNE 1951

[8-30 A.M. TO 11 A.M.]

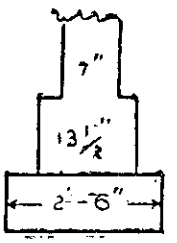
Marks.

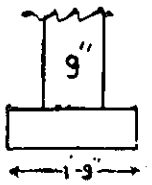
1. Set out a curve of the given degree between the lines *AB* and *AC*. 25

(*b*) Set out the building sketched below :—



PLAN





SECTIONS

MAIN WALLS VERANDAH WALLS

2. Measure the area of given figure by a planimeter. 10

3. Take levels of the points indicated and enter your observations in the form of a field book. Close your circuit on the first point. (First and last reading should be shown to the Examiners before recording). 10

4. Oral questions on adjustment, permanent and temporary of levels. 5

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

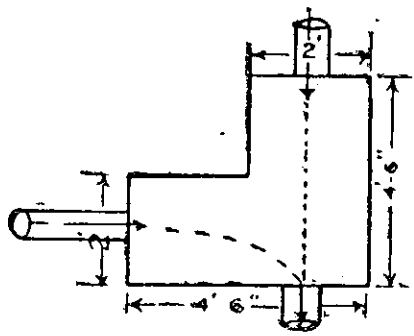
GUJARAT ZONE

Sanitary Engineering (Practical)

27th JUNE 1951

Marks.

1. (A) Prepare a foundation plan for the following type of M-Hole 9 ft. deep assuming necessary details of walling concrete etc. and lay out :— 15



(B) Explain what principles are observed in setting out a manhole where more than two lines meet. How will the benching of the channel formed ? 10

2. Measure the area of given figure by a planimeter. 10

3. Take levels of the points indicated and enter your observations in the form of a field book. Close your circuit on the first point. (First and st reading should be shown to the Examiners before recording.) 10

4. Oral questions on adjustment, permanent and temporary of levels. 5

50

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

General Engineering connected with Roads and Buildings (Oral)

JUNE 1951

Marks.

1. Define :— 12

Voussoir. Catch Water Drain. L. W. M. and S. W. M. in case of expanded metal. French co-efficient of wear.

2. How would you measure and pay— 12

(1) Painting Trellis work. (2) Painting glazed doors. (3) White-washing outside and colour washing inside. (4) R.C.C. T-Beam (Flange and web).

3. How would you prevent fraud when earthwork has to be done in a place where previous bosrow pits already exist. 12

4. How would you fix iron bars in a window frame which is already fixed in masonry and which is not to be taken out. 12

5. Name the different kinds of glasses available on the market. 12

6. (1) What is the size of a dynamite cartridge ? 12

(2) What is the difference between Random Rubble and uncoursed rubble masonry ?

(3) Precast R.C.C. lintel. What special precaution is necessary at the time of placing it in position.

(4) What is the maximum deflection allowed in wooden beams ?

(5) What is safe permissible load on " Bricks in mud masonry " ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

Roads and Buildings with special reference to Modern Type of Road Construction (Oral)

JUNE 1951

Marks.

1. At what intervals are the trees planted ? and how far apart from the edge of road ? 12

What is the economic way of watering in trees on roadside and what are the advantages and disadvantages thereof ?

2. What is the initial and final setting time of Rapid hardening cement ? What is its volume per one cwt. ? 12

Marks.

3. What type of blindage is available in your Division and how much is required for a single spreading per 100 Sq. ft. of area and how many spreadings are considered sufficient per month. 12

4. What is the consumption of Crude or Diesel Oil for 8 hours working of 10 tons Diesel Roller ? 12

What is the consumption of coal for 8 hours working of 10 tons steam roller.

5. What is the maximum superelevation to be allowed ? 15

Where would you begin to give superelevation ?

What are the formation width and land widths to be kept for :—

National Highway.

Provincial Highway.

Major District Roads.

Other District Roads.

Village Roads.

6. Describe very briefly the process of constructing $2\frac{1}{2}$" full grout asphalt Macadam on existing water bound macadam. 12

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

General Engineering connected with Sanitary Engineering (Oral)

27TH JUNE 1951

1. What is meant by " A ", " B ", " B " Class of C. I. Pipes ? What is their test pressures ?

2. What are the prevalent rates for the following ? :—

(*a*) Blacksmith, (*b*) Fitter, (*c*) Oilman, (*d*) Boiler attendant, (*e*) Carpenter.

3. How do you measure the following ? :—

(*a*) 4", 6", and 12" and 24" C. I. Pipe joints.

Is there any thumb rule ?

4. Quote prevalent rates for the following ? :—

(*a*) Laying and jointing 4" C. I. and 6" C. I. Pipes, (*b*) High speed diesel-oil, (*c*) Spun yarn, (*d*) Lead.

5. How would you carry a test of water in the field ?

6. Explain what you know of a Bore hole pump and a centrifugal pump What is meant by a sump pump ?

7. What are the annual depreciation charges for the following ? :—

(*a*) C. I. Distribution System, (*b*) Electric pumping machinery, (*c*) Water Meters.

R. C. C. Service reservoirs.

8. What are the existing Government orders governing Grant-in-aids for the following Local Bodies :—

(*a*) Borough Municipalities.

(*b*) District Municipalities.

(*c*) Village Panchayats.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

Sanitary Engineering (Oral)

27TH JUNE 1951

1. What is meant by self-cleansing velocity ?

What gradients you would adopt for the following :—

(*a*) 6″-S. W. Sewer and 12″ Sewer.

2. What formula you adopt in calculating the discharge of water in pipes ? What value of the constant *C* is assumed for—

(*a*) New C. I. Pipes, (*b*) Reconditioned C. I. Pipes, (*c*) Hume Steel Pipes.

3. What will be the approximate cost of the following :—

(*a*) Pressed steel tank 50,000 gals. capacity 50 ft. high and

(*b*) R. C. C. Tank for the same capacity.

What type of Tank you would use for 5,000 gals. capacity and for what reason.

4. What is the difference in a Hume Steel Pipe and C. I. Pipe joint ? What materials you use in each joint ?

5. State the purpose of the following :—

(*a*) Air valve, (*b*) Creeping flange, (*c*) Non-return valve, (*d*) Duck foot band.

6. How do you make a lead Joint under water ? What material you use ?

7. What do you understand by—

(*a*) Venturi meter, Damp proof course, Sight rail, Boning Rod.

8. What do you understand by the following :—

(1) Peak load, (2) Balancing capacity, (3) Dry weather flow.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

General Engineering connected with Irrigation (Oral)

JUNE 1951

Marks.

1. What are the rates prevailing in your Division for— 15
   (1) 2nd class windows fully glazed.
   (2) Cement concrete flooring 3 inches thick.
   (3) Earth work in canals in cutting upto 5 ft.
   (4) 2nd class Brickwork in cement mortar 1 :.8.
   (5) Cement concrete 1 : 4 : 8 for foundations.

2. What do you understand by— 12
   (1) Soffit of an arch, (2) Post Plate, (3) Barge-Board, (4) Free-Board.

3. What outturn would you consider reasonable for an artesian for— 12
   (1) Brickwork in 9 inch walls, (2) Whitewashing 2 coats, (3) Mangalore tile covering, (4) Pointing to brick work.

4. What are the quantities of materials required for— 12
   (1) Bricks for 100 C.ft. of Brick work 2nd class.
   (2) A. C. Sheets per 100 Sq.ft. of roofing.
   (3) Mangalore ridges per 100 R.ft. of Ridge.
   (4) Lime for 3 coats of White-washing per 100 Sq.ft.

5. What is the difference between "Rapid Hardening Cement" and "Quick Setting Cement"? Where would you use each? 12

6. How do you measure? and pay— 12
   (1) Plaster, (2) Earth work in canal banks, (3) Doors and windows.

75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

Irrigation and Irrigation Act (Oral)

JUNE 1951

Marks.

1. What do you understand by— 15
   (1) Distributary, (2) Bhandhara, (3) Capacity factor, (4) Acre-foot, How many acre-feet make 1 Mc.ft., (5) Rabi-crops.

2. What are the Irrigation seasons in Gujerat? Why and how do they differ from those in Deccan? 12

Marks.

3. What are the average No. of waterings required for maturing :— 12

(1) Sugarcane, (2) Rice, (3) Eight-months crops, (4) Rabi-crops.

4. Explain— 12

(1) Blocks, (2) Block rates, (3) Pass, (4) Post seasonal watering, (5) Two seasonal crops (name a few of these).

5. What is a Panchnama ? When is it made ? 12

6. What is the water rate leviable for unauthorised use of water from a canal ? and what is the penalty under such cases ? 12

75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT ZONE

Accounts and Rules of the P. W. D. (Oral)

27TH JUNE 1951

Marks.

1. What are the initial accounts of works ? 12

2. Enumerate the forms of Bills in the P. W. D. ? 12

3. What is a working estimate ? When is it prepared ? 12

4. What action you will take for a lost cheque whose currency is over ? 12

5. What are the powers of Executive Engineer and Sub-divisional Officer for— 12

(1) Sanction to requisition ;
(2) Hire of Store Houses ;
(3) Imprest advance to subordinates.

6. An addition to the main returns what other account returns are submitted by the Sub-divisional Officer to Divisional office :— 15

(1) Monthly.
(2) Half-yearly.
(3) Yearly.
(4) Occasional.

75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

General Engineering (Roads and Buildings)

25TH JUNE 1951

[WRITTEN PAPER—TIME ALLOWED—3 HOURS] Marks.

1. (*a*) What varieties of stone are used in your District for (1) Steps, (2) Pavement, (3) Bed stones, (4) Copings, (5) String courses, and (6) Road metal. **8**

(*b*) Give sketch plan and section of one of the types of kilns generally used in your District for burning lime.

2. Draw a dimensioned sketch of a steel Roof Truss 30 ft. span with rise $\frac{1}{4}$ span giving the names and sizes of the different kinds of angles, flats, etc. used in its construction. Give its approximate weight. **14**

3. Sketch on elevation and section of a panelled door 6′–6″ × 3′–6″ with frame. Name and dimension the various parts. **8**

4. The face walls of a bridge are found to be going out of plumb. What measures would you adopt to restore the walls ? Illustrate your answer. **8**

5. Describe briefly 3 types of roof with which you are acquainted and give the relative merits of each and the rate per 100 sq. ft. **8**

6. Distinguish between a culvert, a causeway, and a road dam. What considerations would lead you to adopt one or the other of them in a particular case. **10**

7. Draw a sketch of a water supply well 60 feet in depth, 8 feet in diameter, the soil being 8 feet black on top, 15 feet soft murum, rest being rock. **10**

8. What points require to be attended to in the proper maintenance of a water bound macadam road ? **9**

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

General Engineering Irrigation (Written)

25TH JUNE 1951

[TIME ALLOWED—3 HOURS] Marks.

1. Draw a neat sketch of a S. W. F. and name its different parts. **8**
What are the advantages of a S. W. F. as compared with other types of measuring devices ?

2. You are required to prepare a detailed project for a Major Irrigation Scheme. What are the various items on which detailed investigation is necessary ? **10**

Marks.

3. You have inspected one of the following irrigation works. Write out a brief inspection Note :— 6

A masonry bandhara across a nalla and its channel.

Or

A canal acqueduct over a small river.

Or

A ten mile section of a major canal.

4. Prepare a rate abstract for lining a canal section in murumy strata with 4½ inch lime concrete (1½ : 2 : 4). 8

5. Explain what you understand by the following with sketches where necessary :— 10

(i) Cut-off trench ;
(ii) Return or regenerated flow ;
(iii) Water-logging ;
(iv) Coffer-dam ;
(v) Peak-flood ;
(vi) Curtain grouting ;
(vii) Baffle wall ;
(viii) Drainage gallery.

6. What points would you pay special attention to while selecting :— 6

(*a*) Roofing tiles ;
(*b*) Timber for structural work ;
(*c*) Soil for hearting work.

7. Draw a neat dimensioned sketch showing the profile of an earthen dam by making use of the following data :— 12

(i) Chainage on the dam alignment—1700.
(ii) G.L. at chainage 1700—R.L. 1958·60.
(iii) Results of a T.P. at chainage 1700.
0′– 3′ Yellow soil ;
3′– 8′ Murum mixed with grit ;
8′–21′ Compact clayey stuff (Shadoo).
21′–35′ Highly disintegrated rock.
35′ Soft Micaceous schist rock.
(iv) F.S.L.—R.L. 1987·60.
(v) H.F.L.—R.L. 1993·60.
(vi) Average annual rain fall at dam site—50 inches.
(vii) Length of fetch—4 miles.

Justify at least two of the design details adopted by you.

Marks.

8. What are the advantages and disadvantages of:— 9

(i) A syphon spillway;

(ii) An inverted syphon;

(iii) Lift irrigation.

9. What are the guiding principles of designing canal cuts in— 6

(*a*) rocky strata and (*b*) Black soil?

Or

Under what special circumstances is it necessary to resort to—

(i) Blanket grouting over a dam base.

(ii) Screw-piles.

(iii) Raft foundation.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Roads and Buildings with special reference to Modern Types of Road Construction

25TH JUNE 1951

[WRITTEN—TIME ALLOWED—3 HOURS]

Marks.

1. In how many ways can a Railway line be crossed by a Provincial Highway and what considerations will guide the selection of a particular type of crossing? 6

2. What are the Geometric and Structural standards of a road? State these standards for a Provincial Highway. 8

3. What surveys are required and what drawings will have to be prepared for a project of a New Major District Road? 10

4. Explain briefly how you would repair pot holes in (*a*) Metalled road, (*b*) Asphalt road and (*c*) Cement Concrete road surfaces. 6

5. What types of asphalt road construction do you know and under what conditions would you use each? 8

6. How will you readily determine the radius of a curve on an existing road? What are sight distances for vertical curves for different classes of roads? 6

7. Write a short note on the relative merits of cement concrete and asphalt for modernising road surfaces. Draw a dimensioned sketch of a 12 feet wide cement concrete road suitable for heavy modern traffic on an existing metalled Provincial Highway. 8

Marks.

8. What is the difference between a roof of a common rafter construction and a purlin rafter construction? Explain by a sketch how the principal of a purlin rafter roof is lengthened to take on the verandah roof in construction. 8

9. Write out a specification for a 2" Asphalt Macadam over an existing water bound road—metalled width 18 feet. Give a cross section of the road as completed. What would such a surface cost per mile? 8

10. What is Ribbon Development? Why is it prohibited and what are the latest orders on the subject?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Irrigation and Irrigation Act (Written)

25TH JUNE 1951

[TIME ALLOWED—3 HOURS]

Marks.

1. What is the usual interval of watering the following crops and how much water is generally required by each to come to maturity— 6

(i) Sugar-cane;
(ii) Rice;
(iii) Jawar;
(iv) Gram.

2. What is a notified stream? What water rates in terms of the normal flow rates are charged for irrigation from such a stream?:— 10

(*a*) By flow;
(*b*) By lift.

3. What do you understand by— 6

(i) An out-let;
(ii) Seasonal duty;
(iii) A. I. D. C.;
(iv) A soggy bank;
(v) Stop-gate;
(vi) Record of Rights.

4. Describe briefly the measures you, as an S. D. O. in charge of an Irrigation Sub-Division, would adopt to help the Grow-More-Food-Campaign. 10

Marks.

5. What conditions are necessary to examine before sanctioning a cane-block, and what is the significance of each ? 10

6. What are the obligations of irrigators under a Second Class Irrigation Work and what action is to be taken when any of the irrigators fails to perform them ? 6

Or

What is the prescribed procedure for settling disputes between irrigators having mutual rights or liabilities in respect of a water-course.

7. It is observed that the actual draw-off at the head of a distributary is too large as compared with the sanctioned area of crops. Describe how you will proceed to detect the causes and the remedial measures you will adopt to set them right. 12

8. It is necessary to provide a new distributary for irrigating the following areas :— 10

	Acres.
(i) Kharif seasonals	800
(ii) Rabi seasonals	800
(iii) Two seasonal crops	400
(iv) Perennials	100

(*a*) Calculate the capacity required at the distributary head.

(*b*) What discharge will have to be let into the distributary if the standing crops, on the basis of the crop mentioned above, are to be irrigated in a period of 7 days in a rotation of 10 days during January ?

9. What points will you pay special attention to while inspecting— 5

(i) An escape.

(ii) An out-let channel.

(iii) An S. W. F. on a small distributary.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Design and Construction of Earthen Dams (Written)

25TH JUNE 1951

[TIME ALLOWED—3 HOURS]

Marks.

1. Describe with sketches the methods usually adopted for draining the base of an earthen dam. Why is such drainage essential ? 8

2. Explain the use of Steam Rollers on consolidation of earthen dams. What are the advantages of using Steam Rollers instead of bullock rollers for consolidation of earthen dams ? 8

Marks.

3. Sketch the cross-section of an Earthen Dam 40 ft. high where good foundation and drainage materials are available for construction. What is the Hydraulic gradient of an earthen dam? How would the above section be affected by it? 11

4. Write out specifications for— 8

(1) Stone pitching;

(2) Irrigation tank embankment.

5. (*a*) State the circumstances in which breaching sections are provided for earthen dams;

(*b*) What factors would determine whether flood absorption capacity should be allowed for or not in the design of waste weirs?

6. State how you would calculate for a tank— 8

(1) Total capacity; and

(2) Irrigation capacity.

7. What slopes would you give for cutting of canal in soil, soft murum, hard murum and rock? In setting out a bank of a considerable height, what allowance would you make for settlement in— 8

(*a*) Black soil?

(*b*) Ordinary brown soil?

(*c*) Soft murum?

8. Sketch the profile of an earthen dam proposed to be constructed with clayey soil only. 8

9. What steps would you take to repair a breach in the earthen dam of a tank? Sketch up the proposals. 8

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Accounts and Rules of the Public Works Department (Written)

26TH JUNE 1951

[TIME ALLOWED—3 HOURS]

Marks.

1. What papers constitute contract documents? At what stage are they prepared and how are they dealt with? 8

What information should invariably be given on the 'notice to Contractors' for inviting tenders?

Marks.

2. How do you control expenditure on any given work ? What steps would you take if you anticipated an excess— 8

(*a*) on any one item of work ?

(*b*) on the whole estimate ?

3. (*a*) What is earnest money ? 8

(*b*) What is the usual deposit taken from a contractor on the awarding of a contract ?

(*c*) Why is such a deposit taken and under what condition can it be forfeited ?

4. Describe briefly the systems under which the Public Works are carried out ? 8

5. What is a Schedule of Rates ? How many different parts does it consist of ? What is its use ? 8

6. Describe the procedure for acquiring land for the Public Works Department. 7

7. When are the following necessary :— 7

(*a*) Supplementary Estimate ?

(*b*) Revised Estimate ?

(*c*) Reduced Estimate ?

(*d*) Work slip ?

8. What Rules are to be observed before actually starting works ? 7

9. Distinguish between (*a*) Materials at site, (*b*) Stock materials, and (*c*) Surplus materials. 7

10. Describe the uses of— 7

(*a*) A Transfer Entry Order.

(*b*) A Hand Receipt.

(*c*) Sale Account.

(*d*) Survey Report.

(*e*) Demand Draft.

PROFESSIONAL EXAMINATION OF DISTRICT LOCAL BOARD ENGINEERS

SOUTHERN CIRCLE

Bombay Local Board Act and Local Board Account Code (Written Paper)

26TH JUNE 1951

[TIME ALLOWED—3 HOURS]

N.B.—Question No. 1 is compulsory. Answer any other *five* questions.

Marks

1. Comment on the following items :— 20

(*a*) A District Local Board sanctions an expenditure of Rs. 240 incurred by the President in anticipation of the Board's sanction on the reception given to a distinguished personage.

(*b*) The President of a District Local Board maintains that the sanction of Government is not necessary to the appointment of the Board's Engineer as the Government subsidy is claimed on the Chief Officer's pay.

(*c*) Owing to famine conditions the Collector of a District orders the suspension of collection of Local Fund Cess for one year along with the land revenue.

(*d*) On the opinion of a pleader member that a suit for Rs. 6,700 filed against a contractor may not stand the Standing Committee of a District Local Board compromised the claim for Rs. 5,000.

Or

What are the powers of control that can be exercised by the Collector, Commissioner and Government under the Bombay Local Board Act, 1923.

2. What is the procedure prescribed in the Local Board Account Code for payment of pensions payable (i) wholly by the Board and (ii) partly by the Board and partly by Government. 11

3. Mention in brief the points you will bear in mind in preparing the budget estimates of your Board. 11

4. Write short notes on :— 11

(i) Last Pay Certificate ;
(ii) Establishment Returns ;
(iii) Absentee Statement ;
(iv) Secured Advance ;
(v) Issue Rates.

5. What are the powers of a President, District Local Board :— 11

(i) to sanction contracts ;
(ii) to reappropriate funds for works ;
(iii) to sanction advances to contractors ;
(iv) to sanction estimates ;
(v) to write-off unserviceable articles of dead-stock.

Marks.

6. (*a*) How are cash recoveries reflected in the accounts ? 11

(*b*) Can lapsed deposits be refunded and if so, on what conditions ?

7. (*a*) What is the method prescribed in the Bombay Local Board Account Code for the accounting of earnest money received from tenderers ? 11

(*b*) What are the District Local Board Engineer's powers to sanction contracts, piece-work and rate-lists ?

PROFESSIONAL EXAMINATION OF DISTRICT LOCAL BOARD ENGINEERS

SOUTHERN CIRCLE

General Engineering—Roads and Buildings (Oral)

26TH JUNE 1951

Marks.

1. How would you provide iron bars to a window frame already fixed in a building ? 8

2. What field tests will you apply to ascertain the quality of— 8

(*a*) Sand ;

(*b*) Bricks ;

(*c*) Mortar for masonry work ;

(*d*) Cement in bags ;

(*e*) Mangalore tiles.

3. What percentage of voids are allowed for— 8

(1) Sand ;

(2) Soft Murum ;

(3) Hard Murum.

4. What are the safe permissible loads per sq. ft. for the following materials :— 8

(*a*) Black Cotton Soil ?

(*b*) Moist clay ?

(*c*) Compact sand ?

(*d*) Murum ?

(*e*) Granite ?

5. In selecting the site for an Inspection Bungalow, what are the chief points to be attended to ? 8

6. How many plain Mangalore tiles you would order for a roof area of 1,000 sq. ft. and how many bullock cart loads would they amount to ? 7

Marks.

7. What is the meaning of— 7
(*a*) Camber ?
(*b*) Boning Rod ?
(*c*) Transition Curve ?
(*d*) Shift ?

8. Name six kinds of trees suitable for planting on road side. How far apart should they be planted ? 7

9. What are the causes of road corrugation ? 7

10. How is traffic classified in taking a census ? 7

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

General Engineering—Irrigation (Oral)

26TH JUNE 1951

Marks.

1. Describe how you will measure the cold weather discharge of a nalla. 6

2. What is the weight of one cubic foot of :— 6
(i) Trap stone masonry in lime ?
(ii) Seasoned teak wood ?
(iii) Consolidated earth-work ?
(iv) Cement mortar 1 : 3 ?

3. What is the purpose of :— 6
(i) Undersluices ?
(ii) Catch water drains ?
(iii) Stirrups ?
(iv) Grinding lime mortar ?

4. Mention any two engineering problems you may have come across which need research to effect economy in the cost of construction or for ensuring any other facility. 6

5. You are required to design a canal acqueduct across a small river. State what data you will collect. 6

6. Specify :— 9
(i) Daily task work for a Mazdoor for breaking $\frac{3}{4}$" chips.
(ii) Safe maximum velocity of flow in hard murumy strata.
(iii) Roof covering for a store shed.
(iv) Safe permissible load on Cement concrete 1 : 4 : 8.
(v) Water cement ratio for Re-inforced Cement Concrete work of hydraulic structures.
(vi) Scale of accommodation for a Boys' Hostel.

Marks.

7. Define :— 6

(i) Actual command.
(ii) A module.
(iii) A minor.
(iv) French drain.

8. What are the rough and ready tests for ascertaining the fitness of :— 9

(i) Burnt bricks ?
(ii) Sand for Re-inforced Cement Concrete work ?
(iii) Earth for mud plaster ?

9. How do you measure the following for the purposes of payment :— 5

(i) Dry stone pitching ?
(ii) Earth-work in bank ?
(iii) Painting expanded metal (on both sides) ?
(iv) Rubble stacks ?
(v) Steel for re-inforcement ?

10. It is noticed that a nalla bank just upstream of a canal acqueduct is being scoured away with the result that the nearly canal embankment is in danger. State what measures you will adopt to protect the canal embankment. 10

11. State in what aspects the new science of Soil Mechanics has proved of great use in Irrigation Engineering. 6

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Roads and Buildings with special reference to Modern Types of Roads Construction (Oral)

27TH JUNE 1951

Marks.

1. How would you as certain that the road metal has been properly consolidated to receive blindage ? 6

2. When would you inspect masonry works on a road and what are the special points you would look for and when would you carry out necessary repairs ? 6

3. Explain the terms :— 6

(1) Confalt.
(2) Creteways.
(3) Super-elevation.
(4) Bye-pass.

Marks.

4. What items would you attend to on a ghat road before and during the monsoon in a tract of heavy rainfall ? 6

5. Can you adopt the Railway gang system for Road maintainance ? Give reasons for or against. 6

6. What are the defects usually found in bad teak wood ? How are such defects concealed by contractors ? 6

7. How does defective drainage affect the road surface ? What steps would you take to see that the roads in your charge are properly drained ? 7

8. What do you understand by orientation of a building ? What are the chief points to be observed in the location of (*a*) School Building and (*b*) Residential Bungalow, in a given site ? 7

9. How would you measure :— 6

(1) Lime plastering ?

(2) Doors ?

(3) Battens of a Mangalore-tiled roof ?

(4) Earth work in embankment.

10. What are the limits of super-elevation to be given to road surfaces ? 6

11. Describe the method of semi-grouting with bitumen on an ordinary macadam road. 6

12. What considerations would guide you in deciding to :— 7

(*a*) Stick to the old water bound macadam surface ?

(*b*) Adopt a light treatment with Asphalt ?

(*c*) Adopt a heavy treatment with Asphalt ?

(*d*) Adopt a cement concrete road surface ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Irrigation and Irrigation Act (Oral)

27TH JUNE 1951

Marks.

1. Describe the procedure of holding a Punchanama. 5

2. Under what circumstances remission of water rates can be granted ? 5

Marks.

3. Define :— 5

(i) Post seasonal watering.
(ii) Follow-on Crop.
(iii) Rabi crop.
(iv) Tail tank.
(v) Critical velocity.

4. What are the duties of a Canal Inspector ? 4

5. What is rush irrigation ? What are its advantages ? 6

6. What do you understand by (*a*) Shallow soil, (*b*) Medium Soil, and Deep soil ? 10

To what particular soil type is it necessary to restrict Sugar-cane cultivation ? Give reasons to justify your answer.

7. What action will you take when you receive intimation of a large breach in a Canal ? 10

8. A nalla in an irrigated tract is badly choked up with bulrush growth. What will you do to remove the stagnation ? 5

9. When are the following crops usually planted and harvested in the irrigated tract of your Division ? :— 5

(i) Rice.
(ii) Ground-nut.
(iii) Gram.
(iv) Cotton.
(v) Wheat.

10. What duties are generally adopted for preparing irrigation forests with regard to :— 5

(i) Monsoon seasonals ?
(ii) Hot weather seasonals ?
(iii) Eight months crops ?

11. What points will you pay attention to while inspecting a rain-gauge ? 5

12. What is the best position for locating scouring sluices on a bandhara ? 5

13. How do you fix the storage capacity of a minor Irrigation Tank ? 5

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Design and Construction of Earthen Dams (Oral)

27TH JUNE 1951

Marks.

1. What is the purpose of providing berms on earthen dams ? 6

2. What is the usual allowance for silting capacity ? 6

3. An earthen dam is partially completed. What will you do before starting fresh earth work after six months ? 7

4. What special precautions are necessary while providing for stream diversion in the case of an earthen dam ? 7

5. How do you prepare the base of an earthen dam, on natural ground consisting of an overburden of soil ? 7

6. How is the hydraulic gradient in an existing earthen embankment measured ? 7

7. A small portion of the down-stream toe of an earthen dam shows signs of slipping. What corrective measure will you adopt ? 7

8. What do you understand by :— 7

   (1) Free board ?

   (2) Piping ?

   (3) Retrogression ?

   (4) Over-topping ?

   (5) Sheeps' foot roller ?

9. Mention any reliable method for testing whether earth work has been properly consolidated or not. 7

10. What are the main causes of failure of earthen dams ? 7

11. What would you do if you come across a spring while excavating the foundation of a puddle trench ? 7

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE

Accounts and Rules of the P. W. D. (Oral)

27TH JUNE 1951

Marks.

1. What are the powers of Superintending Engineer and Executive Engineer in regard to :— 8

(*a*) Technical sanction to Estimates for works and T & P ?

(*b*) Acceptance of tenders ?

(*c*) Sanction to additional items of work and to rates for such additional items ?

(*d*) Writing off unserviceable stores and tools ?

2. What is a daily report and what information does it contain ? 5

3. What action would you take if in balancing your cash account, you find that the cash balance is short or in excess of the book balance ? 7

4. What points do you attend to before you sign a contractors' bill for work done ? 7

5. What details are entered in a Muster Roll in (*a*) Part I , (*b*) Part II, (*c*) Part III ? 6

6. When does sanction to an estimate lapse ? How is it revived ? 6

7. What is meant by " Contingencies " ? 6

What expenditure is ordinarily included in this term ? Name some items in this category.

8. What is a :— 6

(*a*) Completion Report ?

(*b*) Completion Statement ?

(*c*) Completion Certificate ?

9. How are arrears of wages recorded and paid to work people ? 6

10. What steps would you take if a cheque was lost and what would you do if it was found again after some six months ? 6

11. When is revised administrative approval necessary ? 6

12. What precautions would you take to safeguard against double payments for materials purchased on requisitions ? 6

PROFESSIONAL EXAMINATION OF DISTRICT LOCAL BOARD ENGINEERS

SOUTHERN CIRCLE

Bombay Local Board Act and Local Board Account Code (Oral)

27TH JUNE 1951

[TIME ALLOWED—1 HOUR]

(Total marks—75)

N.B.—Each question carries equal marks.

No more than *six* minutes to be allowed for an answer to each question.

1. In what circumstances can payments be made for work done without detailed measurements ?

2. What do you mean by a Transfer Entry Order ? State when it is necessary.

3. In what circumstances can cash grant be made to a local body by Government ?

4. What contract documents are required to be prepared before a work is given out on contract ?

5. What are the different forms in which security for the due fulfilment of a contract can be accepted from a contractor ?

6. What is meant by Work-charged Establishment and by whom can it be sanctioned ?

7. What are the points to be investigated before passing a contractor's final bill for payment ?

8. Why are measurement books and muster rolls considered as important account records ?

9. What is a Service Book and why is it necessary ?

10. What is the difference between administrative approval and technical sanction ? Who are the competent authorities to sanction such approval ar sanction in respect of a District Local Board work ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

SOUTHERN CIRCLE, BELGAUM

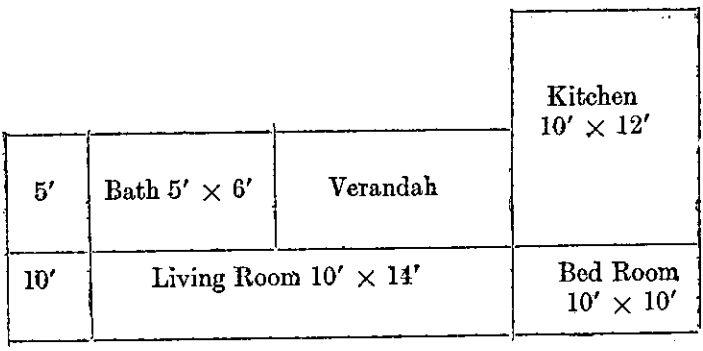
Practical test in the use and adjustment of levelling instruments and theodolite and lining-out of work.

28TH JUNE 1951

	Marks.
1. Read the vertical and horizontal angles between the two objects shown, with a theodolite.	5
2. What are the permanent adjustments of a Dumpy level and in what respects do they differ from that of a precision level ?	10
Check the permanent adjustments of the levelling instrument given to you.	

Marks.

3. Prepare a dimensioned foundation sketch from the following line-plan of a building, and line out its foundation trenches :— 35



Details of walls—

Foundation concrete	..	..	2′–6″ thick.
Plinth walls	..	..	1′–9″ thick.
Superstructure	..	..	1′–3″ thick.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

DECCAN IRRIGATION CIRCLE

Use of Machinery (Written)

25TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Answer any *eight* questions.
All questions carry equal marks.

1. At Surat Water Works a duplicate set of oil engine driven pumping plant is installed. Each set has a capacity of pumping three lakh gallons per hour against a total head of 110 feet. Plant runs daily for 16 hours. Work out the cost of running the plant for the month of May assuming cost of Crude Oil at Rs. 250 per ton. The cost should include the cost of staff required only for running the plant. State the cost of pumping per W. H. P. hour.

2. Write short notes on any *one* of the following :—
   (*a*) The Cooling system of internal combustion engines ;
   (*b*) Supercharging in internal combustion engines ;
   (*c*) Fuel injection methods.

Illustrate your answers with neat sketches.

3. Describe in details the principal parts of a Steam Road Roller ? What is the overall efficiency of such Road Rollers. How the motion is reversed in such type of Rollers and how the speed is increased or decreased ?

4. Describe the difference between :—

(*a*) Pig iron, (*b*) Cast iron, (*c*) Wrought iron and mild steel. State in short how each is obtained.

5. Where are the following types of bearing used ? Give reasons why they are specially used at these places :—

(*a*) Cast Iron bearings, (*b*) Brass bearings, (*c*) Roller bearings, (*d*) Ball bearings and (*e*) White metal bearing.

What are the methods of lubricating each of these bearings ?

6. Give detailed specifications required for ordering out a Planning machine driven by electricity.

7. What are the causes of the following defects ? and state the remedy :—

(*a*) Knocking sound in a motor car engine, (*b*) Workshop main shafting running excentric, (*c*) A lathe runs well when idle but stops as soon as a cut is started, (*d*) engine bearing runs very hot ?

8. Write out a detailed order for purchasing a pumping set for dewatering purposes having a capacity of 30,000 gallons per hour. Your order should contain all equipment and spare parts for running the plant for 8 months. Please indicate the approximate cost of various items of your order.

9. How will you work out the operating efficiency of a transport truck on a short haul ? Explain giving an example.

10. What are the causes of fuel dilution of lubricating oil in the chamber of a diesel engine ? State how you will proceed to locate the cause.

11. Write out a list of spare parts to be purchased for two year's working for a fleet of 3 motor trucks working on a large water supply construction job at an out of way place.

12. Give out the working cost per day (including depreciation and repairs) of the following :—

(*a*) 10 ton Steam Roller ; (*b*) 3 ton Lorry ; (*c*) $\frac{3}{4}$ ton Drag Line.

13. Write a memo of instructions to the following :—

(*a*) An engine attendant on a 30 H. P. horizontal diesel engine in a workshop.

Or

(*b*) An attendant on a 70 H. P. high speed two stroke diesel engine on a semi-portable generating plant.

14. What are the prevailing wages in your district for the following :—

(*a*) First Class Fitter ;
(*b*) Second Class Turner ;
(*c*) Experienced drag line operator ;
(*d*) Pump attendant ;
(*e*) Qualified wireman.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

General Engineering connected with Irrigation and Irrigation Act (Written)

25TH JUNE 1951

[11 A.M. TO 2 P.M.]

N.B.—Answer any *eight* questions.

All questions carry equal marks.

Total marks 75.

1. You are asked to prepare a project for a Bandhara Irrigation scheme of about 100 acres. State the data you will collect and mention the principal points of the design.

2. What are the bad effects and contributing causes of water logging and salt effloresence in irrigated areas ? What are the preventive and curative remedies ?

3. What is a module ? State the principles on which a full module and a semi-module operates.

4. State the number of waterings and the depth of water required at each watering for the following crops :—

(1) Sugarcane ;

(2) Jowar ;

(3) Wheat ;

(4) Groundnut.

5. State the essential difference in the provision of areas of cross drainage works across (*a*) a road and (*b*) a canal. Give the formula you will adopt.

6. Write out a circular giving instructions to a canal Mistry regarding the plantation and care of canal side trees. Assume that the circular is being issued in April.

7. What are the permissible velocities in the design of a canal in the Deccan ? State what will happen if you depart from the ideal values.

8. Illustrate by neat sketches, elevation and cross section of a canal bridge for a cart tract to enable a draftsman to prepare a drawing from it. The data given are as under :—

Bed width of canal 20 ft. ; side slopes 1½ to 1 ; foundations yellow compact soil for the full depth of the trial pit viz. 12 ft. below C. B. L. ; F. S. D. 5′-6″ ; Ground level 12′-0″ above C. B. L. ; fluming is desired.

9. What is the daily task work for the following :—

(1) Brick work first class ;
(2) White washing 3 coats ;
(3) Excavation in soft murum ;
(4) Breaking metal.

10. Write specifications for any *two* of the following :—

(*a*) Dry rubble retaining wall.
(*b*) Brick work second class.
(*c*) Murum floor.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

DECCAN IRRIGATION CIRCLE

General Engineering connected with use of Machinery (Written)

25TH JUNE 1951

[11 A.M. TO 2 P.M.]

N.B.—Answer any *eight* questions.
All questions carry equal marks.

1. You are given a choice of ordering out a Pneumatic Hammer or a Steam Hammer of the same weight for duty in a general workshop ; which will you select and why ?

2. Write short notes on :—(*a*) Annealing, (*b*) Hardening and (*c*) Tempering as applied to steel.

3. An order to manufacture an 18″ dia. C. I. standard flanged bend of ' B ' Class is given to a workshop. Trace the progress of manufacture, etc. of the bend through the workshops and indicate the various processes it will pass through in each of the shops before despatch. How many bolt holes and of what dia. will you instruct to provide ? To what pressure will the bend be tested ?

4. Write short notes on (*a*) Soldering, (*b*) Brazing and (*c*) Welding. Which flux will you use in each case ?

5. State the advantages and disadvantages of vertical and horizontal oil engines. Indicate the circumstances under which you will prefer each type ?

6. Name and describe any four methods of transmitting power from a prime mover to a pump or to a line shaft.

7. Write short notes on—(*a*) Dial test indicator, (*b*) Crankshaft alignment indicator, (*c*) Inside Micrometer and (*d*) Diaphram gauge.

8. You are instructed to prepare a foundation and carry out erection of a vertical oil engine pumping set. The size of the bed plate is 8′ × 4′ and the weight of the engine with bed plate is 20,000 lbs. The bearing capacity of the soil 15 ft. below ground level is 0·5 tons per sq. ft. Describe the process you will follow while preparing the foundation and also while securing the engine to the foundation. What size of block will you put on the soil and what material will you use for casting the block ?

9. Write short notes on the use of the following :—

(*a*) Rooter ; (*b*) Dozer ; (*c*) Scraper ; (*d*) Grader.

10. State with reasons the economical hauls for the following types of equipments :—

(*a*) Scrapers and tractors, (*b*) Motor scrapers, (*c*) Shovel and trucks.

11. You are asked to place equipment for a 20 mile road construction job. State the data you will require to work out the type of equipment most suitable for the job, the initial and working cost and the production.

12. Write specifications for the purchase of the following to be used on a canal work :—

(*a*) Sheeps foot roller ; (*b*) Foundation unwatering pump for an aqueduct, (*c*) Welding generator for heavy repairs.

13. What actual percentage voids will you assume for the following to obtain pay yardage :—

(*a*) Sand, (*b*) Blasted rock, (*c*) Common earth.

Give weight per Cu. yd. of the materials as measured in the transport vehicles.

14. Write short notes on the following :—

(*a*) Tractive Efficiency, (*b*) Rolling Resistance, (*c*) Additive Oils.

15. Give ownership and operating costs for the following :—

(*a*) 90 H. P. tractor and sheeps foot rollers.

(*b*) 12·15 Cu. yd. motor scrapers.

(*c*) Diesel pump operating against a total head of 50 ft. and discharging 1,000 gallons per minute.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

General Engineering connected with Design and Construction of Earthen Dams (Written)

25TH JUNE 1951

[11 A.M. TO 2 P.M.]

N.B.—Answer any *eight* questions.
All questions carry equal marks.
Total marks 75.

1. What are the different types of automatic waste weir gates ? State the principles on which they operate.

2. Write specifications for any two of the following :—
   (*a*) Fine dressed cut stone work.
   (*b*) C. R. masonry second sort.
   (*c*) Hydraulic slaked lime.

3. What are the standard loads for a two bullock cart for the following :—
   (1) Brick.
   (2) Kunkar.
   (3) Road metal.

4. You are asked to report whether a given soil will be suitable for hearting of a dam. What properties you will want to know and what tests you will carry out ?

5. Do you know of any failure of an earth Dam due to quick draw down ? What should have been done to avoid the weakness in the Dam ?

6. What is zoning in an earth Dam ? Draw a section of a highly zoned dam and explain the utility and necessity of each of the Zones.

7. How will you obtain a dense cement concrete by careful grading ?

8. Write short notes on the following :—
   (*a*) Core wall.
   (*b*) Puddle trench.
   (*c*) Partial pile cut-off.
   (*d*) Rolled fill cut-off.

9. What are the economic considerations in the design of a waste weir in a rock cut channel on the flank of an earth Dam ? Weigh each of the factors.

10. What are the different methods for evaluating the maximum flood for the design of a waste weir of an earthen Dam ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

General Engineering—Water Supply and Sanitary Engineering (Written)

25TH JUNE 1951

[11 A.M. TO 2 P.M.]

N.B.—Answer any *eight* questions.

1. Give Hazen and Williams formula for discharge through pipes. What value of " C " will you adopt in this formula for—

(*a*) A new Cast Iron pipe line, (*b*) An incrusted Cast Iron pipe line, 30 years after it is laid, (*c*) A new Hume Concrete pipe- line, (*d*) A hume concrete pipe line, 30 years after it is laid, (*e*) A stone ware glazed pipe sewer.

2. Design a reinforced concrete dome with necessary ring beam over a 15 ft. dia. infiltration well. Depth of water over the dome at H.F.L. will be 15 ft. Give your calculations. Draw the section of the roof.

3. Work out the quantity of important chemicals and current required for a month to run a water works having rapid gravity filters and electrically driven pumping plant with following data :—

(*a*) Daily supply of water 4 million gallons.

(*b*) Hours of pumping daily—16.

(*c*) Total head against which raw water is required to be pumped is 33 ft.

(*d*) F.S.L. of pure water filter channel is R.L. 50 and F.S.L. of Elevated reservoir within the water works compound is R.L. 112.

Workout the monthly cost of running such a water works with present day rates. Rate of current is one anna per unit.

4. What percentage depreciation will you allow for the following :—

(*a*) Earthen dam, (*b*) Pump house building, (*c*) Electrical pumping machinery, (*d*) Cast iron pipes, (*e*) water meters, (*f*) Civil works of a rapid gravity filter plant, (*g*) Equipment of a mechanical rapid gravity filter plant.

5. Explain with neat sketches the uses of the following :—

(*a*) Ventilator in a sewer, (*b*) Automatic flushing tank in a sewerage system, (*c*) Drop arrangement in a sewer.

6. Write short notes on four of the following :—

(*a*) Chloromine treatment of water, (*b*) Chloronome, (*c*) Infiltration gallery, (*d*) Fire hydrants, (*e*) Water hammer.

7. State the various methods of disposal of dry refuse. Describe in detail the manufacture of compost and the principle underlying the same.

8. Name and describe in short with sketches the best type of latrines you will recommend for the following :—

(*a*) a village school, (*b*) a Casual fair of 50,000 people, (*c*) a suburban town having ample water supply but no underground drainage system, (*d*) a hill station where water supply is limited to 10 gallons per head per day.

9. Describe the various methods of distribution of water in a town and describe the advantages and disadvantages of each. How do you detect and minimise waste of water in a distribution system.

10. Explain briefly any four of the following :—

(*a*) Presence of B-Coli in natural water supply.
(*b*) Subsurface irrigation system of sewage disposal.
(*c*) Sewage sickness of land.
(*d*) Surface drains.
(*e*) Sewer traps.

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E, CLASS II

DECCAN IRRIGATION CIRCLE

General Engineering—Roads and Buildings (Written)

25TH JUNE 1951

[11 A.M. TO 2 P.M.]

N.B.—Answer any *eight* questions.

1. Write short notes on :—

(*a*) Seasoning of Timber.
(*b*) Slaking of lime.
(*c*) Skew backs.
(*d*) Minton Tile Flooring.
(*e*) How to render glass opaque.

2. Explain the points you would notice while inspecting :—

(1) Polished Shahabad Flooring.
(2) First Class Brick Masonry.
(3) Cement Concrete of a Slab.

3. Design a R. C. C. Tank 40,000 gallons giving all necessary dimensions.

4. Give Specifications and Rate Abstract for Corrugated Sheet Roofing.

Or

Mangalore Tiled Roofing with Ceiling.

5. (*a*) Give briefly precautions necessary while laying the cement concrete of a floor.

(*b*) How working joints are left ?

(*c*) What steps are necessary for starting work after recess ?

(*d*) Mention measures necessary for making Cement Concrete Water Proof for a tank and for roof.

6. A portion of the Road passing through a Village treated with surface painting has been badly damaged due to heavy traffic of 1,200 tons per day. Give specifications you would adopt for improving the road surface and approximate cost of repairing 4 furlongs with 12 feet finished surface.

7. Design a Class Room for 40 boys. Prepare a dimensioned sketch showing provisions of floor space. Mention other dimensions you propose to adopt.

8. Give detailed instructions to your overseer for preparing centering for a Culvert 20 feet span and laying cement concrete Block Arching till you strike the Centering.

9. Design a Central Stair Case for an office Building, height from floor to floor to be 16' assume suitable dimensions of the staircase room and explain by suitable sketches.

Or

Design an Aqua Privy with one seat for an Inspection Bunglow.

Or

Design Sanitary Attachment necessary for a Factory with 200 workers. Give all assumptions on which your design is based.

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E., CLASS II

POONA 1

Accounts and Rules of the Public Works Department (Written)

26TH JUNE 1951

[11 A.M. TO 2 P.M.]

[TIME ALLOWED—3 HOURS]

N.B.—Answer question No. 1 and any *seven* questions out of the remaining.

1. Prepare a sample Form of a Sub-Divisional Officers' Cash Book, showing few typical entries such as—

(*a*) Money received on behalf of Government.

(*b*) Money received as the amount of Auction Sale.

(*c*) Cheque received as Security Deposit.

(*d*) Few payments of different kinds.

Close the Cash Book for the month and show all closing entries.

Or

(*a*) Prepare a sample Form of Imprest Account showing various kinds of entries as mentioned above as far as possible.

(*b*) Explain the procedure adopted in making payments for workers and the materials received.

(*c*) How money received by the Sub-Divisional Officer on behalf of Government is accounted for ?

2. (*a*) Explain the initial records on which the accounts of Sub-Division are based.

(*b*) Explain the different forms adopted for making payment to the Contractors and specify the purpose for which each is used.

3. (*a*) Describe the procedure adopted in securing materials for the work for issuing to the Contractor and using it Departmentally.

(*b*) What Documents are required to be prepared and maintained in this connection ?

(*c*) How the cost of materials issued is finally accounted for ?

4. How the progress of work is watched in the Sub-Divisional Office ?

What documents are required to be maintained in this connection ? prepare a Sample form of most important document with few suitable entries.

5. Explain the following :—

(*a*) Transfer Entry Order.
(*b*) Workslip.
(*c*) Supplementary Estimate.
(*d*) Revised Estimate.
(*e*) Completion Report.
(*f*) Technical Sanction.
(*g*) Extra Item.
(*h*) Security Deposit.
(*i*) Hand Receipt.
(*j*) Survey Report.

6. (*a*) Explain the types of contract Forms used by the Public Works Department and the purpose for which each is used.

(*b*) Explain briefly procedure adopted for calling Tenders and further st till it is accepted, also mention the powers of different officers of accepting tenders.

Or

Explain the procedure you would follow in carrying a most important work in anticipation of sanction and allotment of funds. What are the prevailing orders of Government in this connection ?

7. Explain the procedure adopted for acquisition of Land required by the Public Works Department and by another Department and the Method of making payment for land compensation.

Or

Explain the procedure to be followed in executing the work required by this Department or requisitioned by the head of other Department.

2. (*a*) Explain the initial records on which the accounts of Sub-Division are based.

(*b*) Explain the different forms adopted for making payment to the Contractors and specify the purpose for which each is used.

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Explain the procedure you would follow in carrying a most important work in anticipation of sanction and allotment of funds. What are the prevailing orders of Government in this connection ?

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Or

Explain the procedure to be followed in executing the work required by this Department or requisitioned by the head of other Department.

8. What are different kinds of Stores maintained in a Sub-Division ?

Explain the periodical account documents required to be maintained in this connection. Prepare a sample Form of one of the documents showing few entries.

9. Prepare a sample Muster Roll with all Parts showing few entries in each.

Or

(*a*) How do you account for unpaid wages and how payments are made subsequently ?

(*b*) What action is necessary if a Muster Roll is lost ?

(*c*) Explain Casual Muster Roll. When it is used ?

10. Describe the following :—

(1) Original and Repair works.

(2) Administrative approval and Technical sanction.

(3) Advance payment and secured Advances.

(4) Revised and Supplementary estimate.

(5) Workslip and completion Report.

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE.

Road and Buildings (Written)

25TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Answer any *eight* questions.

1. Draw a typical Cross Section of a National or a Provincial Highway in (*a*) Bank, (*b*) Cutting, (*c*) in Hilly portion assuming suitable dimensions.

2. Give specifications for $2\frac{1}{2}$" Asphalt Macadam surface (Semi Grout) with reconditioning Sub Grade. Give Rate Abstract of this item.

3. Explain the following :—

(*a*) Water Table.

(*b*) Surface Dressing.

(*c*) Primer.

(*d*) Asphaltic Concrete.

(*e*) Ruling Gradient.

4. Why Super-elevation is necessary for a Road ?

Explain the factors governing the amount of super-elevation to be given to a road. Mention the amount of super-elevation given in few cases known to you.

5. Give detailed instructions for—

Resurfacing badly damaged water Bound Macadam 12 feet wide road surface. Give Quantities you would specify and the section you would finally expect.

6. Write down specifications and Rate Abstract for brick Masonry suitable for an Inspection Bungalow.

7. Design a Culvert for 10 feet span assuming suitable dimension. Give rough sketches showing dimensions proposed.

8. Explain different kinds of Timber used in your Division. What precautions you would take for protecting it.

9. Give specifications and Rate Abstract for Cement Concrete flooring suitable for Domestic Building or a Factory or a big Assembly Hall.

10. Explain with sketches a truss you would adopt for 25 feet span or 40 feet span or 80 feet span with Asbestos sheet roofing showing all component members of the roof.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Water Supply and Sanitary Engineering (Written)

25TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Answer any *eight* questions.

1. What do you understand by hardness in domestic water ? What are its draw-backs ? Name the various processes by which domestic water can be softened. For a Rayon Factory water with almost no hardness is required ; which of above processes will you recommend ? and why ?

2. Town of Sangli is to be provided with a water supply scheme. The source of supply is Krishna River having good fine sand for a depth of 15 ft. below bed. Yield test taken during the hot weather in a trial pit indicates a safe yield of 50 gallons per sq. ft. per hour at 6 ft. filtration head. Design the headworks for a population of one lakh with a rate of 40 gallons per head per day. The bed of the river if R. L. 1840 H. F. L. R. L. 1900 and G. L. 600 ft. away from the bank is R. L. 1910. Give a dismentioned sketch design of the headworks consisting of River bed works, connecting pipe and jack well with necessary pump house.

3. Write short notes on any *four* of the following :—

(1) pH value, (2) B.O.D., (3) Clariflocculator, (4) Hydraulic gradient in a pumping main, (5) Sludge gas.

4. Write out detailed short specification of laying, jointing and testing 15 inch dia. G. I. pipe rising main 3,000 ft. long.

5. Write short notes on—

(*a*) Slow sand filter, (*b*) Semi-rapid filter and (*c*) Rapid mechanical gravity filter. For taluka town having 25,000 prospective population which will you prefer and why ?

6. Draw dismentioned sketches in plan and section of an Elevated Reinforced concrete reservoir of 4½ lakh gallons capacity. The ground level at the site is R. L. 1850. F.S.L. of the reservoir is proposed as R.L. 1936 and the bed is at R.L. 1920. Hard rock is at 8 feet below ground. Mark on your sketches all the necessary appurtenances required. Give short specifications of concrete mixes you would adopt for various parts of the reservoir. What stresses will you allow in cement concrete and steel for columns and walls for your design ?

7. Design a suitable Sewage Purification Plant for the town of Broach having a prospective population of one lakh souls and a water supply rate of 30 gallons per head per day. Tides of Narbada River flowing up reach 10 miles upstream of the town and is thus considered unsuitable for carrying sewage or effluent. If you decide to use effluent on land give the area of land you will include in your farm. Illustrate your answer with sketches.

8. What are the specific conditions necessitating the pumping of sewage in a sewerage scheme ? The outfall sewer 45 inches in dia. enters the main pumping station with its invert 22 ft. below ground. The population to be connectioned to the sewer is 3 lakh souls and water supply rate is 36 gallons per head per day. Design your main pump house and draw sketch of the same in plan and section.

9. A hospital town having 2,000 beds is proposed to be sewered and it is decided to provide septic tank and trickling filter for purification of the sewage. Design your purification works and draw a dismentioned section, through the septic tank and filter.

10. Give the chemical analysis of a domestic screened sewage from a town having a water supply rate of 30 gals. per head per day. Give the following details :—(*a*) Oxygen absorbed at 37°C in 4 hours. (*b*) B.O.D. at 37°C after 5 days. (*c*) Suspended solids. What reduction do you expect in these three items by purifying such a sewage in a clariflocculator ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Design and Construction of Earthen Dams (Written)

25TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Answer any *eight* questions.
All questions carry equal marks.
Total marks 75.

1. State why it has been possible recently to build high Earthen Dams with a greater degree of security.

2. What is cohesion and friction of a Soil? How are they determined? What use are the values made in the design of an Earthen Dam?

3. State what precautions you will take to see that the drains in an earthen dam will always function satisfactorily.

4. State the different types of failure of an Earthen Dam; and give in brief the precautions necessary in each case, for proper design and construction.

5. Plan out a Scheme of construction-equipment for an earthen dam with the following data :—

(1) Earth work 40 M. C. ft.;
(2) Soils mostly hard to dig;
(3) Lead 800 feet one way;
(4) Topography—gently undulating lands;
(5) Dam Section comprises of water tight clay and murum shoulders.

Give approximate present day prices of the equipment and the cost per unit of the earth work.

6. Where would you prefer shovel excavation to a drag-line Excavation?

What production per day of 8 hours do you expect from a $\frac{3}{4}$ cub. yard. Shovel operating on blasted rock in an open quarry loading in 6 cub. yard vehicles?

Give rate analysis for loading.

7. State the different types of construction pumps and give the strong and the weak points of each for unwatering the deep cut off trench of a Dam.

8. What care will you take in the design and construction of an earthen dam and the outlet to see that no failure will occur at the outlet?

9. State how you will proceed to find out whether a given section of an earthen dam will be stable.

10. Write briefly a circular giving instructions to the Overseer in charge of a dam embankment. Bring out points of usual pit falls.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Irrigation and Irrigation Act (Written)

25TH JUNE 1951

[3 P.M. TO 6 P.M.]

N.B.—Answer any *eight* questions.
All questions carry equal marks.
Total marks 75.

1. State the inch depth of water allowed to a sugar factory per season at distributary head and at canal head.

Say how this compares with the actual consumption by local irrigators.

2. State what you know about the following :—
   (1) Register of Water Applications ;
   (2) Register of Panchanamas ;
   (3) Pass Books ;
   (4) Tipan Books.

3. What is the implication of the notification of a river under section 5 of the Irrigation Act ?

How does it affect the irrigation existing before and done after the date of notification from the water of the river ?

4. What are the rights and obligations of the owners of water courses ?

5. If a private water course goes out of repairs causing waste of water, what action can you take as a Canal Officer ?

6. Classify the following crops into Perennial, two seasonal, monsoon and Rabi or Hot Weather crops :—

Sugarcane, Khapla, Cucumber, Rice, French beans, Potatoes, Plantains, Lucern, Sweet potatoes, Onion, Maize and Kadwal.

7. What are the prevailing water rates for the following :—
   Sugarcane in Block and out of Block ;
   Monsoon seasonals ;
   Rabi seasonals ;
   Hot weather seasonals.

8. What is a Record of Right in connection with a second class irrigation work ?

What titles and liabilities the Record contains ?

How does the Record of Right of lands under a first class irrigation work differ from that of lands under a second class irrigation work ?

9. Describe in detail the procedure from the start to the recovery of the fine for a case of waste of water from a distributary to a river caused by a sugar factory.

10. What is an overlap ? Under what limitations are sanctions given ? How is an overlap sanction applied for when the cane is (*a*) in Block and (*b*) outside Block ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

DECCAN IRRIGATION CIRCLE

Use of Machinery—Practical Test

30TH JUNE 1951

[9-30 A.M. TO 11-30 A.M.]

1. The last shift is over and you are asked to take over the charge of a Horizontal Cold Start Diesel Engine. What precautions you will take and what items you will check up before starting the engine ? Check up all these points and start the oil engine before you.

2. Cut the 2″ × 2″ angle iron provided to you in exact 6″ length with the Shearing and punching machinery.

3. Cut $1\frac{1}{4}$″ dia. Mild Steel bar with the hack-saw machine to proper length and fix it in the engine lathe for making the $\frac{5}{8}$″ dia. 3″ long Bolt.

4. You are required to rivet the 2 R.S. joists by Pneumatic rivetting. Start the compressor at site and undertake the rivetting work.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

General Engineering connected with Irrigation and Irrigation Act (Oral)

27TH JUNE 1951

[9 A.M. TO 12 NOON]

N.B.—All questions carry equal marks.
Total marks 75.

1. What do you understand by the following :—
   (*a*) Catch-water drain ;
   (*b*) Ogee fall ;
   (*c*) Gauge run ;
   (*d*) Pick up weir ;
   (*e*) Level crossing.

2. What types of drains are constructed on a Land drainage scheme ? Where would you select each of them ? What is the usual depth of the drains ?

3. (*a*) How many bricks you need per 100 cub. ft. of 1st class brick work ?

(*b*) How much rubble you will need for U. C. R. masonry 2nd sort ?

(*c*) How many Mangalore tiles you will need for 100 sq. ft. of roofing ?

4. How will you obtain stable canal banks in an area where mainly Karal is available ? Do you know of any such banks ? What troubles are they giving and how will you avoid them in the design and construction of new banks.

5. (*a*) What is a hydraulic gradient ? Can you control this ?

(*b*) What is an afflux ? What will happen if provision is not made in the design for the afflux at a road bridge across a canal ?

6. What are the prevailing rates in your District for the following :—

(*a*) Lime concrete in foundations ;

(*b*) Cement concrete 1 : 3 : 6 in foundations ;

(*c*) C. R. masonry 2nd sort in lime mortar including cement pointing for building ;

(*d*) Painting new wood work 3 coats ;

(*e*) Supplying slacked lime,

7. State the special points you will look into while approving the following :—

(1) Sand for cement plaster ;

(2) Metal for road ;

(3) Metal for lime concrete foundations ;

(4) Teak wood for doors and windows ;

(5) Ferry boat on a public road.

8. You are asked to prepare a project for a small irrigation tank. State the data you will collect during your survey and the information you will present to the Cultivators while inviting contributions from them.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Accounts and Rules of the Public Works Department (Oral)

29TH JUNE 1951

[1 P.M. TO 6 P.M.]

N.B.—All questions carry equal marks.

Total marks 75.

1. (*a*) How is the progress of expenditure on a P. W. D. work watched ? State what steps are to be taken taken if you anticipate excess over the sanctioned estimate.

(*b*) What are Extra Items ? Why do they arise and how are they dealt with ?

Mention the powers of different Officers of sanctioning extra items.

(*c*) How do you deal with changes considered necessary during construction ?

2. What action is taken when a Cheque is lost ?

What is the currency of a Cheque ? State the procedure to be followed in the case of an uncashed cheque after the currency period.

What precautions are necessary for conveying Cash and for its safe custody ? What action you would take if the keys of your safe were lost ?

3. Explain how you will deal with the cash received on behalf of Government.

What is the limit of imprest account ?

Differentiate between the Imprest and Temporary Advance.

4. What is stock ? Why it is maintained ? What is stock limit ?

Explain the necessity of maintaining Purchase Account.

How are materials received on stock accounted for when utilised ? How to issue rate worked out ? When is stock checked ?

5. Explain the Categories into which Tools and Plant are divided.

State what forms are used for maintaining the accounts of the Tools and Plant in a Sub-division.

State how tools lost are accounted for.

6. How is the material at site Account maintained ?

For what materials is such account necessary ?

Explain the purpose of Road Metal Rate Book and Metal Return.

State what you understand by schedule of rates and explain how they are maintained.

7. Give briefly the rules to be observed while recording measurements.

What are the powers of Overseers and Sub-Divisional Officers for recording measurements ?

8. What measures would you adopt in the following cases :—

(1) Surplus cash found in the Chest.
(2) When an estimate is likely to be exceeded.
(3) Sending of Tools for repairs.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEER, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

General Engineering connected with Design and Construction of Earthen Dams (Oral)

27TH JUNE 1951

[9 A.M. TO 12 NOON]

N.B.—All questions carry equal marks.

Total (marks 75).

1. What do you know about the following :—

(1) Sand lenses ;
(2) Pore Pressure ;
(3) Deep Well Drainage.

2. What is the utility of the upstream impervious blanket ? How will you determine the Length of the Blanket required ?

3. What are the different types of cut-off for an earth Dam ? Indicate conditions under which they can be most suitably adopted.

4. How will you decide what provision will be necessary in a dam under sign against future settlement and how will you provide against it ?

5. What do you know about the electrical analogy as applied to the solution of flow pattern through earth work ? How does it help to solve complicated problems ?

6. What is Optimum Moisture content ? What are the effects of departure from such moisture contents in the construction of a Dam ?

7. What care is necessary in the preparation of foundations of an earth dam at a site where the depth of rock is 50 feet below ground level, and the overburden is sand and clay ?

8. What are Atterburg's limits ? What physical characteristics do they convey ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

General Engineering connected with use of Machinery (Oral)

27TH JUNE 1951

[9 A.M. TO 12 NOON]

N.B.—Attempt any *eight* questions.
All questions carry equal marks.

(Marks 75).

1. What are the present day wages of a :—
   (*a*) Turner ;
   (*b*) Welder ;
   (*c*) Workshop Foreman ;
   (*d*) Boring Operator.

2. How many cubic feet of steam coal will be carried in a three ton Truck ?

3. How many numbers of 15″ dia. 12′ long C. I. Pipes can be carried in a 3 ton Truck ?

4. What is a hydraulic gradient and how is it measured in a water supply distribution main ?

5. What do you understand by :—
   (*a*) Flash point ;
   (*b*) Splash lubrication.

6. Give the temperature of the following :—
   (i) Exhaust gases from an oil engine ;
   (ii) Outlet temperature of circulating water of an oil engine ;
   (iii) Outlet temperature of water in an economiser.

7. How many pounds of steam at 212° farenheit can be generated fro a pound of good Bengal coal ?
   What is the present rate of this coal ?

8. What do you understand by carbon tool steel and Alloy tool steel ? Where are they best used ?

9. What are the different methods of welding ? What type of work can be most suitably done on each ?

10. You are getting a lot of air bubbles in a casting. What care will you take to avoid the same ?

11. You are required to supervise the erection of a generator belt-driven by a high speed diesel engine. State the precautions you will take in the erection.

12. A motor car is misfiring. State how you will proceed to detect the mistake.

13. What are the types of diesel engine lubricants in the market and what are they recommended for ?

14. A petrol water-cooled engine is running too hot. State how you will proceed to detect the mistake.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

General Engineering—Water Supply and Sanitary Engineering (Oral)

27TH JUNE 1951

[1 P.M. TO 6 P.M.]

1. How many 15″ diameter 12 feet long C. I. pipes will be carried in a three ton truck ? How many table moulded bricks will be carried in the above truck ? What is the rate of laying, jointing and testing 15″ diameter C. I. pipe line in a prepared trench.

2. What are the present day rates of :—

(*a*) Alum per ton.
(*b*) Heavy Diesel oil per ton.
(*c*) Chlorine gas.
(*d*) Tropical chloride of lime.

3. What is pre-chlorination and where and why do you use it ? What doze will you consider desirable ?

4. What are the various types of pipes used as sewers ? Where will you recommend each type for use ?

5. What are the rates in your Division for the following :—

(*a*) Coursed rubble masonry in cement mortar for a service reservoir.
(*b*) $\frac{3}{4}$″ thick cement plaster.
(*c*) Pig lead.
(*d*) Cement concrete for foundation, 1 : 2 : 4 proportion.

6. A town having sewerage system and small industry is being supplied with 40 gallons rate of water per head per day. State these requirements under different heads and sub-heads giving gallons used for each sub-head.

7. What are the various types of motive powers used for driving pumping machinery and where will you recommend the use of each of these.

8. What is a composite dam, and where will you recommend its use in preference to earthen or masonry dams.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Design and Construction of Earthen Dams (Oral)

28TH JUNE 1951

[1 P.M. TO 6 P.M.]

N.B.—All questions carry equal marks.
Total marks 75.

1. State the working costs of the following :—

(*a*) A three ton lorry per day transporting stone metal over a lead of 2 miles; manual loading and unloading;

(*b*) A road roller on consolidation of murum embankment per day;

(*c*) A two drum sheepsfoot roller on a suitable tractor;

(*d*) A $\frac{1}{2}$ cubic yard dragline excavating in silty soil per day.

2. What points will you stress in a circular on haul-roads of a mechanised construction ?

Give rolling resistance for :—

(*a*) Hard surface dry road on which tyres make no impression;
(*b*) Soft earth road with some wet and loose material on the top;
(*c*) Clean wet sand.

3. What is the fundamental use of the following in an earthen Dam :—

(*a*) Puddle trench;
(*b*) Downstream rock toe;
(*c*) Metal behind pitching;
(*d*) Parapet walls.

4. The downstream toe of an earthen dam has bulged and slipped. What can be the causes ? How will you find and remedy them ?

5. Give rates for the following in your District :—

(*a*) Supply of rubble for masonry work;
(*b*) $\frac{3}{4}''$ crushed metal lead 10 miles;
(*c*) Lime plaster including fine coat of neeru;
(*d*) Opening out deep joints and re-pointing random rubble masonry face—complete item.

6. What precautions will you take to see that on a big job the large strength of labour is fully and effectively engaged and no room is left for mal-practices ?

7. You have to set up a small temporary construction Camp for a dam. What points will you bear in mind to set up and run such a Camp ?

8. What do you know of :—

(*a*) Viksburg criterian of filters ?
(*b*) Piping failure ?
(*c*) Critical density of sand ?
(*d*) Glory hole ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Use of Machinery (Oral)

28TH JUNE 1951

[1 P.M. TO 6 P.M.]

N.B.—Answer *eight* questions only.
All questions carry equal marks.
Total marks 75.

1. What type of electrical installation is more expensive to maintain D.C. or A.C. ? and why ?

2. What are the various methods of pumping out water from a 400 ft. deep bore ; static water level being 60 ft. below ground.

3. What is—
   (*a*) a universal milling machine ;
   (*b*) a venturi meter.

4. What are the advantages and disadvantages of gas welding and electrical welding ?

5. Where will you prefer rivetting to welding and why ?

6. What are the various uses to which a compressor can be put to in an important engineering work ?

7. Explain the following terms :—
   (*a*) Tolerance ;
   (*b*) Clearance ;
   (*c*) Allowance.

8. State suitable material for the following :—
   (*a*) Impellor of a sewage pump.
   (*b*) Casing pipe for boring works.
   (*c*) Floats for filters.
   (*d*) Bed plate for an oil engine.

9. A motor truck is sent to you for repairs against " excessive fuel and oil consumption ". State how you will proceed to locate the cause.

10. What is the standard production of a 16″ × 8″ stone crusher working on trap rock ? What is approximately the present day cost of such a machine ? What spare parts will you order with the machine ? What will be operating cost per day ?

11. What is a motor grader ? What are its uses ? Would you recommend it for the construction of village approach roads in a hilly place ?

12. What are the present day rates for the following :—

(*a*) Light diesel oil ;

(*b*) Detargent high grade lubricant oil ;

(*c*) Welding generator 250 amps. capacity A.C. working on petrol mounted on rubber wheels ;

(*d*) 3″ × 3″ pump on a 5 H.P. 3 phase El. motor.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Water Supply and Sanitary Engineering (Oral)

28TH JUNE 1951

[1 P.M. TO 6 P.M.]

1. Explain the following and state their importance in a sewerage scheme :—

(*a*) Self-cleansing velocity.

(*b*) Limiting velocity.

(*c*) Water seal.

2. What is conservancy method ? Where would you recommend its use ?

3. How is water pumped out from a 10″ diameter sub-artesian bore ; water being met with at 300 feet below ground, and the static water level is 60′ below ground.

4. What is an outfall sewer ? and of what material will you construct it for a town having a population of 3,00,000 ? Give your reasons for selecting it.

5. How will you take a recuperation test for an infiltration work in a river bed ? What approximate rate of infiltration will you adopt for your preliminary report for a river like Bhima having a minimum discharge of 100 cusecs and good sand for 15 feet depth.

6. Why is service reservoir required in a town ? What should be its capacity and location ?

7. Why is sterilisation considered necessary in case of all public water supplies even when filtration is provided ? How is this sterilization achieved ? What should be the usual dose of the steriliżer for properly filtered water ?

8. What is trade waste and how will you dispose it off in an important industrial town having complete underground sewerage system and where effluent is used for irrigation on land ?

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

General Engineering (Roads and Buildings) (Oral)

27TH JUNE 1951

[2 P.M. TO 6 P.M.]

1. What precautions are necessary for Excavating deep open foundations of a wall ? Give safe bearing powers of yellow soil, Hard Murum and Soft Rock.

2. Explain the tests you would carry out for determining the quality of lime ? What is surkhi mortar and where it is used ?

3. Explain the slump Test of Cement Concrete.

What slumps recommended for different kinds of concretes.

What Timber is used for concrete forms. Mention when forms are struck following words :—

Beams ; Slabs ; Columns.

at Camber is given to the Centering and why ?

Explain the points you would notice while inspecting the wood work of r : (2) a window ; (3) furniture ; (4) Ceiling ; (5) panelling of partition walls.

timber is protected ?

causes decay of timber ?

the following :—

. L.

ontal and Vertical Curves.

exity or barelling.

water area and how it is determined.

e the working stresses allowed in the R. C. C.

eel and Concrete ?

xplain ordinary high and special grade concretes.

hat are the points of contra flexture.

What are the essentials of a good well from Hygienic point of view and s Public Utility and Safety is concerned.

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Roads and Buildings (Oral)

28TH JUNE 1951

[1 P.M. TO 6 P.M.]

1. What out-turn would you expect as a task duty for the following per day :—

(1) Excavation in Wet Soil lift 5 feet lead 100 feet.
(2) White washing 3 coats.
(3) Glazing.
(4) Plank Ceiling.
(5) Cement Plaster $\frac{1}{2}''$ thick.

2. Describe the working of an intermittant lime kiln and state what size obtain about 200 Cft. of lime per day you would adopt.

3. What are the permissible loads for the following :—

(1) Compact Gravel.
(2) Moist Clay.
(3) Black Cotton Soil.
(4) Good Brick Masonry in Cement Mortar.

4. A Bridge was submerged under water during high floods and Old arch masonry though intact seems to be porous and bottom plaster h washed away. How will you strengthen and protect the Bridge for the fu

5. What instructions would you give to your Road Karkun or M protecting the Roadway before and after the Monsoon ; mention stage propose and period when these items should be carried out.

6. Mention points you would notice while inspecting coursed of a pier or a building.

7. Mention the Rates of the following items :—

(1) Asbestos Sheet Roofing.
(2) Asbestos Walling or partitions.
(3) Glazed and barred window.
(4) R. C. C. work (Excluding reinforcement).
(5) Brick Masonry in cement mortar.

8. (*a*) Explain the process of Fixing Iron Centering for a Bridge. How trusses hoisted.

(*b*) Explain the process of Erecting a Framed Structure of Steel or R. C

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Irrigation and Irrigation Act (Oral)

28TH JUNE 1951

[1 P.M. TO 6 P.M.]

N.B.—All questions carry equal marks.

Total marks 75.

1. At what rates will you assess the following panchanamas :—

(*a*) Waste of water ;

(*b*) Water taken to seasonals in excess of sanction ;

(*c*) Water from canal taken repeatedly to cane on well ;

(*d*) Water taken to Bajri mixed with tur when the application is for Bajri only.

2. What is a shejpali patrak ? How is it prepared ? Who keeps it ? How its accuracy generally checked ?

3. What points will you attend to specially in the maintenance of an irrigation drainage scheme ?

4. What is rush system of irrigation ? What are its advantages and disadvantages ? How will you plan it for a rotation ?

5. What do you know of the following :—

(*a*) Irrigation Bunds ;

(*b*) Unitization ;

(*c*) Soil Classification ;

(*d*) Hydro-Iso bath.

6. Why is water logging caused in an irrigated area ? How can it be prevented ? And how can such lands be brought back to cultivation ?

7. Under what conditions can remissions of irrigation assessment be granted ?

State the procedure how the remission is in effect given.

8. What is the effect of applying the Bombay Tenancy and Agricultural Act of 1948 to the irrigated areas ? What new problems has it created ?

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Practical Test

28TH JUNE 1951

[TIME ALLOWED—3 HOURS]

Marks.

1. Line out the structure as per accompanying plan. **30**

2. Take levels of the points indicated by shifting instrument at 3 points and close the circuit. **10**

3. Read Angle between two points *A* and *B* shown to you from Station *X*. **5**

4. Explain how you would use :— **5**

   (*a*) Plane table.

   (*b*) Prismatic compass.

   (*c*) Ebony level.

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E., CLASS II

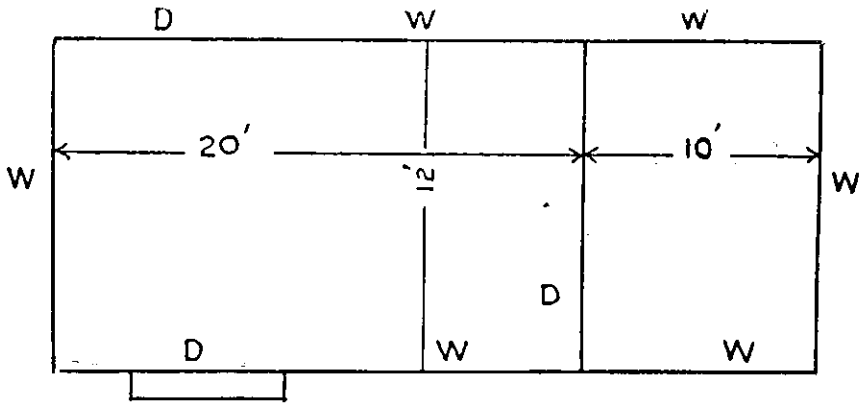
DECCAN IRRIGATION CIRCLE

Practical Test

28TH JUNE 1951

[TIME ALLOWED—1 HOUR]

1. Line out the structure as per plan given below :—



Notes.—(1) All Dimensions given are clear inner dimensions.

(2) Thickness of wall 18 inches.

(3) Assume suitable section of foundation 4' deep resting on hard murum.

(4) Plinth 18 inches.

(5) Front steps 5' wide.

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E., CLASS II

DECCAN IRRIGATION CIRCLE

Practical Test

29TH JUNE 1951

[TIME ALLOWED—3 HOURS]

Marks.

1. Line out the structure as per accompanying plan. 25

2. Take levels of three points indicated below by shifting instrument at 3 points and close by circuit— 10

Points.—Plinth of compound wall of the Court marked *A*.

Plinth of Pavalion marked *B*.

Point on Court marked *C* by arrow.

3. Read angle between two points *A* and *B* shown to you from station *X* (viz., lightning conductor of chimney and Flag Staff of the Court). 5

4. *Use any three* Instruments out of five :— 10

(*a*) Plane Table.—Plot two points shown to you (viz., lightning conductor of College Main Building and the Flag Staff of Military School.

(*b*) Prismatic Compass.—Find out angle horizontal between lightning conductor of College and Flag Staff of the Shri Shivaji Military Preparatory School.

(*c*) Ebony Level.—Find out virtual angle from given point of Ligtning conductor on chimney of the College and the Flag Staff top of the Court Building.

(*d*) Plain meter.—Find out area of the figure given.

(*e*) Sextant.—Find out angle as mentioned in the case of Prismatic compass.

PROFESSIONAL EXAMINATION OF OFFICERS OF B. S. E., CLASS II

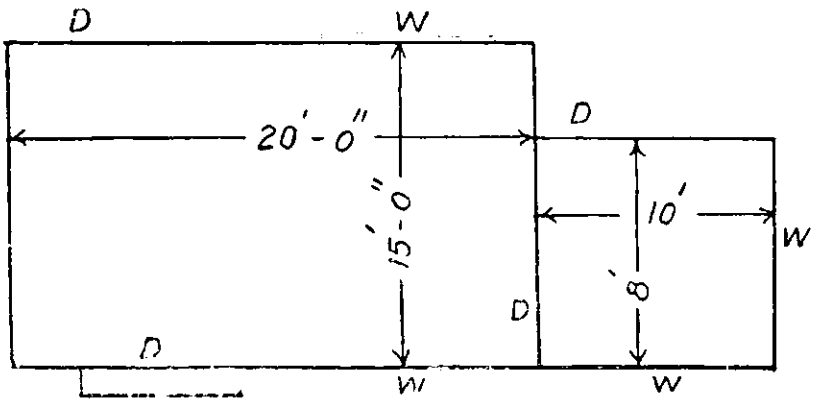
DECCAN IRRIGATION CIRCLE

Practical Test

29TH JUNE 1951

[TIME ALLOWED—1 HOUR]

1. Line out the structure as per plan given below :—



Notes :—

(1) All Dimensions given are clear inner dimensions.

(2) Thickness of wall 18 inches.

(3) Assume suitable section of foundation 4′ deep resting on Rock.

(4) Plinth 18 inches (height).

(5) Front steps 5′ wide.

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS AND ASSISTANT ENGINEERS

BOMBAY ELECTRIC GRID

Accounts and Rules of the P. W. D. (Written Paper)

25TH JUNE 1951

[10-30 A.M. TO 1-30 P.M.]

N.B.—Question No. 5 is compulsory and carries 15 marks while other questions carry 12 marks each.

Total marks 75.

Marks.

1. What are the duties and responsibilities of a disbursing officer with regard to money he is required to handle. Enumerate the steps he should take to ensure that the balance of cash as shown in the cash book at the end of a month is correctly arrived at. 12

Marks.

2. What are the main features distinguishing piece work contract from regular contract. In regard to regular contract work what are the usual stipulations with regard to— 12

(*a*) Rate of progress.

(*b*) Punishment when progress of work is slow and work is not completed within the contracted period.

(*c*) Recovery of security Deposit for due performance of the contract and its refund to the contractors.

3. What points are required to be specified in public notices inviting tenders for works. 12

4. How are the Purchase Account and Public Works Miscellaneous Advances Account operated on. Specify some transactions which are accounted for under them and state how they are cleared. 12

5. Prepare a 2nd Running Account Bill of Contractors Messrs. A. B. & Co. for the work of construction of a transmission line. Items paid in the first Running Account Bill are given below :— 15

(i) Advance payment for 250 tons of steel at Rs. 400 per ton.

(ii) Advance payment for conductor for 100 miles of conductor at Rs. 1,000 per mile.

(iii) Secured advance for Insulators, 600 strings Rs. 100 per string.

(iv) Secured advance for Aggregate material, 10,000 C.ft. at Rs. 40 Brass.

The following items of work are done since the 1st Running Account Bill was paid :—

(i) Full steel secured, measured and found to be 300 tons at Rs. 400 per ton.

(ii) Conductor measured and found to be 120 miles at Rs. 1,000 per mile.

(Advance payment made in the first bill to be adjusted in the second bill).

(iii) 500 strings of insulators utilised out of the 600 strings for which secured advance was made.

(iv) 200 new strings of insulators brought to site of work.

(v) Brought cement 1,000 bags at market rate at Rs. 5 per bag.

The following recoveries are to be made from the bill and balance to be paid by cheque :—

(i) Withheld Rs. 200.

(ii) Recover Rs. 300 as security deposit.

(iii) Recover Rs. 1,000 for materials issued from stock.

6. What is ordinary capital in an electrical undertaking and what are the items of expenditure which are met out of it. 12

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS AND ASSISTANT ENGINEERS

BOMBAY ELECTRIC GRID

Accounts and Rules of the P. W. D. (Oral Paper)

26TH JUNE 1951

[2-30 P.M. TO]

N.B.—Question No. 1 is compulsory and carries 15 marks and others carry 10 marks each.

Total marks 75.

Marks.

1. What percentage of check measurements is necessary to be carried out by a Sub-Divisional Officer and an Executive Engineer in the case of recorded measurements by :— **15**

(i) Overseer or a Junior Engineer for work done on muster roll.

(ii) Karkun for work done on muster roll.

(iii) Overseer for work done on Running Account Bill for regular B 2 tender when the cost of work done is Rs. 200.

(iv) Overseer for work done and paid on First and Final Bill for A-2 contract costing Rs. 150.

(v) Overseer for work done on B-2 tender for Bill amounting to Rs. 1,000.

(vi) Overseer for supply of materials costing Rs. 100.

2. What is understood by :— **10**

(*a*) Voucher.
(*b*) Advice of transfer debit and credit.
(*c*) Form 256 E.
(*d*) Write back order.
(*e*) Revised estimate.

3. What action are you required to take as an Executive Engineer in charge of a division if you are asked by the Superintending Engineer to commence a work for which no estimate is administratively approved and technically sanctioned and for which no budget allotment is granted ? **10**

4. Contractor Shree *B* reports that cheque issued in his favour for Rs. 1,000 on Ratnagiri Treasury from the office of the Chief Engineer is lost or stolen. What action should be taken on receipt of this report before a fresh cheque is issued ? **10**

5. What are the minor and major works and what are the powers of Executive Engineers to sanction an estimate :— **10**

(*a*) administratively,
(*b*) technically.

In cases of (*a*) Power house buildings and staff quarters and (*b*) electrical works ?

Marks.

6. Deposit recovered from a contractor is forfeited for not completing the work in time and thus the work has suffered by paying enhanced rate. How will the deposit forfeited be accounted for and to what account the credit should be afforded ? 10

7. Whose sanction is necessary for incurring the expenditure on the following items:— 10

(i) Opening ceremony of a Power House—Rs. 500.

(ii) Distribution of sweets to labour for completion of work satisfactorily—Rs. 100.

(iii) Payment of railway fare to labour brought for the work.

(iv) Advance of Rs. 1,000 to a contractor before the work is started.

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS (ELECTRICAL AND MECHANICAL) AND ASSISTANT ENGINEERS (ELECTRICAL AND MECHANICAL)

ELECTRIC GRID DEPARTMENT—GOVERNMENT OF BOMBAY

Indian Electricity Act, 1910 ; Indian Electricity Rules, 1937 ; The Electricity Supply Act, 1948 (Written Paper)

27TH JUNE 1951

[2-30 P.M. TO 5-30 P.M.]

Marks.

1. Under what sections of the Indian Electricity Act or rules, the methods of construction of the electrical installation of a licensee, have to be approved by the Electrical Inspector. Are these rules applicable to the installations of the Bombay Electric Grid Department ? If the Electrical Inspector refuses to pass certain items of the installations and if you are convinced that his action is inappropriate, what procedure will you adopt to overcome the objections ? Who is the final authority in the matter ? 8

2. Name the principal items in the installation of a licensee involving power supply at 400/230 volt, 3 phase, four wire system, which are likely to be critically examined by the Electric Inspector, in the interests of safety to life and property—Quote relevant references in the Electricity Act. 8

3. What are the voltage ranges of a low, medium high and extra high pressure systems as given in the Indian Electricity Act. 8

State the permissible limits of variation from declared normal values of voltage and frequency.

What is the permissible degree of accuracy of electricity meters and the tolerances allowed ? Quote relevant references of the Act and rules.

Marks.

4. What are the maximum and minimum distances from the walls of a control room at which it is permissible to install an open type switch-board ? 11

State the type of earthing to be provided for, in a generating station where the voltage of generation is 11 KV and power supply is effected to a distant sub-station at 110 KV by means of step up transformers.

What is the minimum size of copper conductor for town distribution lines and service lines.

What are the permissible factors of safety regarding poles or towers conductors ?

What is minimum ground clearance and distance from buildings for overhead lines ? Quote relevant sections of the Act and rules.

5. If an organisation applies to the Electricity Board for power supply and if its demand is more than half the firm capacity of the generating station of the licensee of the area, is it obligatory to the Board to arrange for a direct power supply as demanded ? 8

Quote relevant references from the Electricity Supply Act (1948).

6. Describe the procedure to be adopted by the Provincial Electricity Board for taking up a new power project, in a region within its jurisdiction. 8

Quote the relevant clauses of the Electricity (Supply) Act (1948), which refer to the various actions to be taken.

7. State the different methods by which the Provincial Electricity Boards are expected to raise the funds required for (i) the extensions of the existing projects and (ii) taking up new projects. 8

Explain how the respective revenues should be allocated to the different items of expenditure ? Mention the various heads of expenses in the appropriate order.

8. What is a controlled power station and under what circumstances may the Electricity Board direct it to be closed down permanently ? 8

In such a case what are the alternatives available for the licensee to dispose of the plant ? Quote relevant references of the Electricity Supply Act (1948).

9. In connection with the Electric supply in a licensee's area if an accident occurs resulting in a loss of life, and if you are in charge of the installation, state what action you will have to take in their proper sequence. Quote the relevant section of the Electricity Act which prescribe the procedure. 8

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS (ELECTRICAL AND MECHANICAL) AND ASSISTANT ENGINEERS (ELECTRICAL AND MECHANICAL)

ELECTRIC GRID DEPARTMENT—GOVERNMENT OF BOMBAY

Indian Electricity Act, 1910 ; Indian Electricity Rules, 1937 ; The Electricity Supply Act (1948) (Oral Examination)

28TH JUNE 1951

[2-30 P.M. TO]

Marks.

1. If an organisation desires to secure a licence for generating and supplying electricity to a town in the State of Bombay, what are the measures to be taken and procedure to be adopted for the purpose ? **10**

2. For constructing overhead power supply lines in the prescribed area of supply of a licensee, where the lines have to pass through Municipal limits, cross a railway line, and run parallel to telegraph and telephone lines, what is the procedure to be followed in carrying out the work expeditiously and and in accordance with the prescribed regulations ? **10**

3. In a licensee's area can two industrial organisations having their factories on opposite sides of a public road generate their own power separately for supplying to their factories ? Can they install a combined power house for supplying power to both the factories by means of a cable through a proper duct under the road. If the organisation which holds the electricity license for this area raises any objection to the power being generated independently, how does the industrialist have to meet the situation ? **10**

4. State the functions and duties of the Central Electricity Authority and its constitution. When did this come into existence and where are its headquarters ? **10**

What is the composition of Provincial Electricity Board and its functions and duties ?

5. Will the Central and Provincial Governments derive any revenue on account of the enactment of the Electricity Supply Act of (1948) and if so, in what manner ? **10**

How are the differences of opinion or disputes between the Provincial Board and the licensee in that region decided ?

6. When a transmission line of a licensee is taken over by the Provincial Electricity Board for its own use and not purchased outright, what are the charges payable for the use of the line ? **10**

Marks.

7. For the purpose of calculation of the percentage rates of depreciation, as per the Electricity Supply Act (1948), what is the average life prescribed for the following :— 15

(*a*) Reservoir Dam.

(*b*) Hydro electric plant.

(*c*) Steam turbo plant and boilers.

(*d*) Pressure tunnel for water conduits in a hydro station and penstocks.

(*e*) 66 KV lightning arrestors.

(*f*) Power cables, control cables.

(*g*) Survey instruments, drawing office equipment and instruments.

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS AND ASSISTANT ENGINEERS

BOMBAY ELECTRIC GRID

Accounts and Rules of the P. W. D. (Written Paper)

25TH JUNE 1951

[10-30 A.M. TO 1-30 P.M.]

(TIME—3 HOURS)

N.B.—Question No. 5 is compulsory and carries 15 marks while other questions carry 12 marks each.

Total marks 75.

Marks.

1. What are the duties and responsibilities of a disbursing officer with regard to money he is required to handle. Enumerate the steps he should take to ensure that the balance of cash as shown in the cash book at the end of a month is correctly arrived at. 12

2. What are the main features distinguishing piece work contract from regular contract. In regard to regular contract work what are the usual stipulations with regard to— 12

(*a*) Rate of progress.

(*b*) Punishment when progress of work is slow and work is not completed within the contracted period.

(*c*) Recovery of Security Deposit for due performance of the contract and its refund to the contractors.

3. What points are required to be specified in public notices inviting tenders for works. 12

Marks.

4. How are the Purchase Account and Public Works Miscellaneous Advances Account operated on. Specify some transactions which are accounted for under them and state how they are cleared. 12

5. Prepare a 2nd Running Account Bill of Contractors Messrs. A. B. & Co. for the work of construction of a transmission line. Items paid in the 1st Running Account Bill are given below :— 15

(i) Advance payment for 250 tons of steel at Rs. 400 per ton.

(ii) Advance payment for conductor for 100 miles of conductor at Rs. 1,000 per mile.

(iii) Secured advance for Insulators, 600 strings Rs. 100 per string.

(iv) Secured advance for Aggregate material, 10,000 C.ft. at Rs. 40 Brass.

The following items of work are done since the 1st Running Account Bill was paid :—

(i) Full steel secured, measured and found to be 300 tons at Rs. 400 per ton.

(ii) Conductor measured and found to be 120 miles at Rs. 1,000 per mile.

(Advance payment made in the 1st bill to be adjusted in the 2nd bill.)

(iii) Five hundred strings of insulators utilised out of the 600 strings for which secured advance was made.

(iv) Two hundred new strings of insulators brought to site of work.

(v) Brought cement 1,000 bags at market rate at Rs. 5 per bag.

The following recoveries are to be made from the bill and balance to be paid by cheque :—

(i) Withheld Rs. 200.

(ii) Recover Rs. 300 as security deposit.

(iii) Recover Rs. 1,000 for materials issued from stock.

6. What is ordinary capital in an electrical undertaking and what are the items of expenditure which are met out of it. 12

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS AND ASSISTANT ENGINEERS

BOMBAY ELECTRIC GRID

Accounts and Rules of the P. W. D. (Oral Paper)

26TH JUNE 1951

[2-30 P.M. TO]

(Total Marks—75)

N.B.—Question No. 1 is compulsory and carries 15 marks and others carry 10 marks each.

Marks.

1. What percentage of check measurements is necessary to be carried out by a Sub-Divisional Officer and an Executive Engineer in the case of recorded measurements by :— **15**

(i) Overseer or a Junior Engineer for work done on muster roll.

(ii) Karkun for work done on muster roll.

(iii) Overseer for work done on Running Account bill for regular B-2 tender when the cost of work done is Rs. 200.

(iv) Overseer for work done and paid on First and Final Bill for A-2 contract costing Rs. 150.

(v) Overseer for work done on B-2 tender for Bill amounting to Rs. 1,000.

(vi) Overseer for supply of materials costing Rs. 100.

2. What is understood by :— **10**

(*a*) Voucher.

(*b*) Advice of transfer debit and credit.

(*c*) Form 256 E.

(*d*) Write back order.

(*e*) Revised estimate.

3. What action are you required to take as an Executive Engineer in charge of a division if you are asked by the Superintending Engineer to commence a work for which no estimate is administratively approved and technically sanctioned and for which no budget allotment is granted ? **10**

4. Contractor Shree *B* reports that cheque issued in his favour for Rs. 1,000 on Ratnagiri Treasury from the office of the Chief Engineer is lost or stolen. What action should be taken on receipt of this report before a fresh cheque is issued ? **10**

Marks.

5. What are the minor and major works and what are the powers of Executive Engineers to sanction an estimate— 10

(*a*) administratively,

(*b*) technically.

In cases of (*a*) Power house buildings and staff quarters and (*b*) electrical works ?

6. Deposit recovered from a contractor is forfeited for not completing the work in time and thus the work has suffered by paying enhanced rate. How will the deposit forfeited be accounted for and to what account the credit should be afforded ? 10

7. Whose sanction is necessary for incurring the expenditure on the following items :— 10

(i) Opening ceremony of a Power House—Rs. 500.

(ii) Distribution of sweets to labour for completion of work satisfactorily—Rs. 100.

(iii) Payment of railway fare to labour brought for the work.

(iv) Advance of Rs. 1,000 to a contractor before the work is started.

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS (ELECTRICAL AND MECHANICAL) AND ASSISTANT ENGINEERS (ELECTRICAL AND MECHANICAL)

ELECTRIC GRID DEPARTMENT—GOVERNMENT OF BOMBAY

Indian Electricity Act, 1910 ; Indian Electricity Rules, 1937 ; The Electricity Supply Act, 1948 (Written Paper)

27TH JUNE 1951

[2-30 P.M. TO 5-30 P.M.]

Marks.

1. Under what sections of the Indian Electricity Act or rules, the methods of construction of the electrical installation of a licensee, have to be approved by the Electrical Inspector. Are these rules applicable to the installations of the Bombay Electric Grid Department ? If the Electrical Inspector refuses to pass certain items of the installations and if you are convinced that his action is inappropriate, what procedure will you adopt to overcome the objections ? Who is the final authority in the matter ? 8

2. Name the principal items in the installation of a licensee involving power supply at 400/230 volt, 3 phase, four wire system, which are likely to be critically examined by the Electric Inspector, in the interests of safety to life and property—Quote relevant references in the Electricity Act. 8

Marks.

3. What are the voltage ranges of a low, medium high and extra high pressure systems as given in the Indian Electricity Act. 8

State the permissible limits of variation from declared normal values of voltage and frequency.

What is the permissible degree of accuracy of electricity meters and the tolerances allowed ? Quote relevant references of the Act and rules.

4. What are the maximum and minimum distances from the walls of a control room at which it is permissible to install an open type switchboard ? 11

State the type of earthing to be provided for, in a generating station where the voltage of generation is 11 KV and power supply is effected to a distant sub-station at 110 KV by means of step up transformers.

What is the minimum size of copper conductor for town distribution lines and service lines.

What are the permissible factors of safety regarding poles or towers and conductors ?

What is minimum ground clearance and distance from buildings for overhead lines ? Quote relevant sections of the Act and rules.

5. If an organisation applies to the Electricity Board for power supply and if its demand is more than half the firm capacity of the generating station of the licensee of the area, is it obligatory to the Board to arrange for a direct power supply as demanded ? 8

Quote relevant references from the Electricity Supply Act (1948).

6. Describe the procedure to be adopted by the Provincial Electricity Board for taking up a new power project; in a region within its jurisdiction. 8

Quote the relevant clauses of the Electricity (Supply) Act (1948), which refer to the various actions to be taken.

7. State the different methods by which the Provincial Electricity Boards are expected to raise the funds required for (i) the extensions of the existing projects and (ii) taking up new projects. 8

Explain how the respective revenues should be allocated to the different items of expenditure ? Mention the various heads of expenses in the appropriate order.

8. What is a controlled power station and under what circumstances may the Electricity Board direct it to be closed down permanently ? 8

In such a case what are the alternatives available for the licensee to dispose of the plant ? Quote relevant references of the Electricity Supply Act (1948).

9. In connection with the Electric supply in a licensee's area if an accident occurs resulting in a loss of life, and if you are in charge of the installation, state what action you will have to take in their proper sequence. Quote the relevant section of the Electricity Act which prescribe the procedure. 8

PROFESSIONAL EXAMINATION OF EXECUTIVE ENGINEERS (ELECTRICAL AND MECHANICAL) AND ASSISTANT ENGINEERS (ELECTRICAL AND MECHANICAL)

ELECTRIC GRID DEPARTMENT—GOVERNMENT OF BOMBAY

Indian Electricity Act, 1910 ; Indian Electricity Rules, 1937 ; The Electricity Supply Act, 1948 (Oral Examination)

28TH JUNE 1951

[2-30 P.M.]

Marks.

1. If an organisation desires to secure a licence for generating and supplying electricity to a town in the State of Bombay, what are the measures to be taken and procedure to be adopted for the purpose ? **10**

2. For constructing overhead power supply lines in the prescribed area of supply of a licensee, where the lines have to pass through Municipal limits, cross a railway line, and run parallel to telegraph and telephone lines, what is the procedure to be followed in carrying out the work expeditiously and in accordance with the prescribed regulations ? **10**

3. In a licensee's area can two industrial organisations having their factories on opposite sides of a public road generate their own power separately for supplying to their factories ? Can they install a combined power house for supplying power to both the factories by means of a cable through a proper duct under the road. If the organisation which holds the electricity license for this area raises any objection to the power being generated independently, how does the industrialist have to meet the situation ? **10**

4. State the functions and duties of the Central Electricity Authority and its constitution. When did this come into existence and where are its headquarters ? **10**

What is the composition of Provincial Electricity Board and its functions and duties ?

5. Will the Central and Provincial Governments derive any revenue on account of the enactment of the Electricity Supply Act of (1948) and if so, in what manner ? **10**

How are the differences of opinion or disputes between the Provincial Board and the licensee in that region decided ?

6. When a transmission line of a licensee is taken over by the Provincial Electricity Board for its own use and not purchased outright, what are the charges payable for the use of the line ? **10**

Marks.

7. For the purpose of calculation of the percentage rates of depreciation, as per the Electricity Supply Act (1948) what is the average life prescribed for the following :— 15

(*a*) Reservoir Dam.

(*b*) Hydro electric plant.

(*c*) Steam turbo plant and boilers.

(*d*) Pressure tunnel for water conduits in a hydro station and penstocks.

(*e*) 66 KV lightning arrestors.

(*f*) Power cables, control cables.

(*g*) Survey instruments, drawing office equipment and instruments.

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Professional Examinations of Assistant, Deputy Engineers and Supervisors in 1950

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BOMBAY
PRINTED AT THE GOVERNMENT CENTRAL PRESS
1951

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS.

SOUTHERN CIRCLE, BELGAUM.

28th June 1950.

ACCOUNTS AND RULES OF THE PUBLIC WORKS DEPARTMENT (Oral).

(Marks 75).

		Marks
1.	What action is to be taken when an excess over estimate is anticipated at (*a*) commencement, at (*b*) at a late stage nearing completion. What are the powers of Sub-Divisional Officers, Executive Engineers and Superintending Engineers to sanction excesses over estimate ?	6
2.	What penalties can be enforced on a contractor for not completing a work in time under B-1 or B-2 tender ?	8
3.	(A) What are Earnest Money and Security Deposit ? What are the limits ? (B) What is a Solvency Certificate and When it is needed and for what purpose ?	8
4.	What is a Register of works. When is it necessary and what information does it give ?	5
5.	How is the Schedule of rates prepared and what purpose does it serve ?	8
6.	Explain what is a Sale List and a sale account. Describe the procedure for holding an auction sale of the fishing rights of a tank.	6
7.	What are work Abstracts ? How are they prepared and what useful purpose do they serve ?	5
8.	(A) What is a Note Book, a Measurement Book and a Work Order Book ? (B) When do you issue tools to a contractor and under what conditions ?	9
9.	What is an Imprest Account ? Who is eligible to hold an Imprest and up to what amounts ordinarily ? What is a temporary Imprest ? What are its limits ?	10
10.	(A) What conditions must be fulfilled before a work is started. (B) What is a Transfer Entry Order and when is it used ?	10

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS.

SOUTHERN CIRCLE.

26th June 1950.

ACCOUNT AND RULES OF P. W. D. (Written).

(TIME : 2-30 P. M. to 4-30 P. M.)

(Marks 75)

Marks

1. A contractor's progress on an important and urgent Building work is very slow and he does not improve in spite of repeated letters and warnings. What are the various alternate ways of carrying out the work to completion ?

   Show in each case how you proceed to take action in the case of different types of contracts and how the contractor and Government are affected. 15

2. Draw up a specimen Mustor Roll for a period of 14 days for constructing departmentally a Hume Pipe drain completely including parapets and coping after dismantling an existing slab drain, the work is estimated to cost about Rs. 500 excluding the cost of Hume Pipes and Cement. Complete Part III. 15

3. Describe briefly the various forms of contracts and agreements in use in Public Works Department what form is most used in your Sub-Division ? 15

4. What kinds of contracts or agreements or agencies do you recommend in the following cases any why ?

   (*a*) Village Water Supply Well works (*a*) Scattered and (*b*) in groups.

   (*b*) New Hume Pipe Drains scattered.

   (*c*) Large scale construction work involving 90 per cent. labour and only 10 per cent. materials.

   (*d*) Deep foundation work of a bridge or a weir involving costly shoring watering and machinery for which fabulous rates have been quoted by contractors.

   (*e*) Minor Irrigation tank works (*a*) Scattered and (*b*) in groups.

   (*f*) Large R. C. C. or steel bridge works for which experts can submit alternative economic designs, 15

Note. : Answer any three of the following six questions,

Marks

4. Under what heads are the stores of the Public Works Department classified and what are the Divisions and Sub-Divisions of Tools and Plant. What are the powers of a Divisional Officer for purchase of stores ? 10

5. Which do you prefer B-1 or B-2 tenders and why ? Write a notice calling for B-2 tenders for the Executive Engineer for the construction of a class I Bungalow, the works portion of which is estimated to cost Rs. 60,000. 10

6. What are the main documents that constitute the transfer papers of a Sub-Divisional Officer ? 10

7. During the course of the annual check by the Sub-Divisional Officer, the following are noticed. What action do you propose to take and how are the transactions finally settled ?

   (*a*) One Tape missing with the overseer.

   (*b*) 200 baskets issued to a contractor on loan are not yet returned.

   (*c*) 1,000 Mangalore tiles in stock are broken.

   (*d*) 1,000 Cft. of metal is found in excess on a road.

   (*e*) 2,500 Cft. murum is found short due to the wash out by floods. 10

8. A fairly big land slip occured and more than half the road has been washed away on an important Ghat road due to heavy rainfall. Describe how you proceed and what steps are necessary from administrative and accounts point of view to restore the communications. 10

9. Comment on the following :–

   (*i*) A piece worker expresses his inability for further execution of work.

   (*ii*) A regular contractor applies for extension after the period of contract on grounds of his ill health.

   (*iii*) A contractor desires to terminate his B-1 tender when about half the contract period has expired finding local rates being very high.

   (*iv*) A contractor is short of funds and request payment on items which are not complete.

   (*v*) A contractor quotes 20 per cent. below estimated rates and his tender is accepted. 10

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS.

BELGAUM.

GENERAL ENGINEERING (Oral).

27th June 1950.

(Marks 75)

Marks

I. (*a*) What are the different methods adopted for preventing damp from rising up the walls of a building ?
(*b*) How do you preserve timber against white ants ?
(*c*) What arrangements you will adopt to prevent blowing away of Mangalore tiles ? 9

II. (*a*) Where do you leave construction joints in the case of R. C. C. slab and beams ? and why ?
(*b*) What is the function of stirrups in beams ?
(*c*) When sufficiently long bars are not available how do you make the overlap joint ?
(*d*) When there are number of overlap joints in various rows of on R. C. C. arch, how will you arrange them ? 8

III. Explain what is meant by the following and what purpose is served by them ?
(1) Weep holes ; (2) Rat Lip ; (3) Header ; (4) Water table ; (5) Template ; (6) Boning Rod ; (7) Curtain wall ; (8) Cut-back asphalt ; (9) Expansion joint in a Road way concrete slab. 9

IV. (*a*) State the various points you would observe when inspecting a site for a bridge.
(*b*) State the various points you would consider while fixing the alignment of a road. 10

V. You are required to prepare plans and estimates for a cross drainage work over a nalla with waterway say 80′ long. What data you will ask your overseer to collect and how would you proceed to frame the design ? 10

VI. What are the current rates for the following in your Sub-Division or locality ?
(*a*) Burnt Bricks 2nd class Hand-moulded.
(*b*) Rubble at quarry.
(*c*) Lime.
(*d*) Cement concrete 1 : 4 : 8 for foundation.
(*e*) Burnt brick masonry 2nd sort (with cement mortar 1 : 5) without pointing.

Marks:

(*f*) Plinth masonry cement mortar 1 : 5 uncoursed rubble 2nd sort.

(*g*) Mangalore tiles roof.

(*h*) Reinforced cement concrete (1 : 2 : 4) for beams.

(*i*) Asbsestos Sheet Roofing. 9

VII. What would you consider a reasonable day's work for—

(*i*) A coolie excavating and carrying earth 100′ lead.

(*ii*) A coolie breaking metal from rubble supplied.

(*iii*) A mason laying uncoursed rubble masonry 2nd sort.

(*iv*) A mason laying brick masonry 2nd sort.

(*v*) A coolie spreading metal. 10

VIII. How much materials of each kind you would require for—

(*i*) 10 sq. ft. of white-wash 3 coats.

(*ii*) 100 sq. ft. of oil-paint 1 coat.

(*iii*) 100 sq. ft. of cement plaster $\frac{3}{4}$″ thick.

(*iv*) 100 sq. ft. of lime plaster.

(*v*) 100 cft. of cement concrete (1 : 2 : 4). 10

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS.

SOUTHERN CIRCLE.

28th June 1950.

PRACTICAL TEST.

(Marks 50)

Marks.

1. Line out the foundations of Block 5B of the building shown on the accompanying blue print after sketching out the dimensioned foundation plan of the portion. 30

2. Set up the Theodolite and find out the horizontal angle between the 2 points shown to you and the vertical angle to a third points. 10

3. Mark out the catchment area at a site A shown on the blue print and find out the area by the Planimeter in square miles. 5

4. What is this instrument and explain how it is used. 5

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS.

GENERAL ENGINEERING (Written).

BELGAUM.

26th June 1950. Marks.

(Time : 11-00 A. M. to 1-00 P. M.)

1. What are the characteristics of good bricks and good stone for building ? Why and how long are bricks soaked in water ? State the quantities of different materials required for 100 Cft. of stone-masonry (18″ wall) with khandki facing-and rubble backing ? 10

2. Calculate the load on the foundation of a detached public hall 40′×16′ walls of Brick masonry 18½″ thick height of room 14′. Single storey. R. C. C. roof slab 6″ thick. Parapet wall 2′-6″ high 14″ thick with pillars 18½″ thick at 10′ centre to centre approximately. Assume 3 R. C. C. beams 10″×20″ (including the slab). 19′-1″ long. Design suitable width and depths for plinth masonry and foundation concrete. Plinth to be 1′-6″ above Ground Level. Trial pit result shows 1′-6″ of clay and there after soft murum for a considerable depth. Draw a cross section of the foundations proposed. 18

3. Describe a few of the various types of roofs and roof coverings which are in common use and give the advantages and disadvantages of each type and draw a cross section of one of them (for 14′ span) showing the different members of the roof. 10

4. Write specifications for the following :—
   (*a*) Reinforced cement concrete Lintel.
   (*b*) Cement concrete (1 : 4 : 8) for foundation.
   (*c*) Earth work for road embankment.

(Attempt any THREE of the following.)

5. A number of important residential buildings and District Bungalows are in your charge. Write out the detailed instructions that you will give to your Overseer for pre-monsoon and post-monsoon repairs of them for the usual annual items of repairs. 9

6. Explain the following terms with neat sketches wherever necessary and state the purpose served by each—
   (1) Quoins.
   (2) Drip moulding.
   (3) Skew-back
   (4) Jack rafter.
   (5) Lock-rail.
   (6) Newel.
   (7) String-Course.
   (8) Groyne.
   (9) Straining Beam. 9

Marks.

7. Make a sketch of half-panelled and half-glazed door with its frame and indicate the names of each part. 9

8. Draw dimensional sketch of a cheap type of a School building with accommodation for 4 classes each with 40 students and 1 teacher's room, (with local materials available). How would you work out roughly its cost? Give the rate for the same per Sq. ft. of plinth for your locality (State the locality). 9

9. What are the principal uses of R. C. C. in buildings, bridges and culverts? What are its advantages over other types of materials which can be used in their places? What are its disadvantages, if any?

Draw a neat hand sketch of a Typical R. C. C. Rectangular beam supported at both ends showing re-inforcement. (Clear span 15') Section (10"×18"). Give approximate dimensions of reinforcement. 9

10. What kind of Trees you would propose for Roadside plantation in your Sub-Division and state reasons for choosing the same. What instructions you would issue to your Overseer about the maintenance of—
(*i*) Young plants in the nursery.
(*ii*) freshly plated roadside trees.
(*iii*) for fully grown up road-side trees. 9

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS.

BELGAUM.

ROADS AND BUILDINGS (Written).

27th June 1950.

(Time : 11-00 A. M. to 1-00 P. M.)

Marks.

I. You are inspecting a First Class residential Building under construction for which the following are specified :—
(*a*) Lime plaster on walls.
(*b*) Windows half-penelled and half-glazed.
(*c*) Cut teak wood trusses.
(*d*) Mangalore Tiled roof on teak wood ceiling.
(*e*) Cement : Tiled flooring.

State the various points you would give attention to at your inspection as regards the above mentioned items. 12

Marks.

II. You have to construct a R. C. C. roof of an Office building (Beams and slabs). Describe the various points you would inspect during the collection of various materials, during the process of erection and removal of centring and during the process of laying concrete and after the concrete is laid. 13

III. (*a*) Write specifications for the modern type of road :—

(*i*) Asphalt premix carpet $2\frac{1}{2}$" thick.

or (*ii*) Cement concrete roadway slab 5" think.

(*b*) Draw a Cross-section of the same [either (*i*) or (*ii*) above] and describe the various operations during construction of the same in sequence.

(*c*) Work out rate-abstract per 100 sq. ft. of the same [either (*i*) or (*ii*) above].

(*d*) What labour arrangement and distribution of work you will make for a day's turn out of either (*i*) half furlong of asphalt premix carpet 2' wide and $2\frac{1}{2}$" thick. 9

or (*ii*) for constructing 8 slabs 30' long 9' wide of 5" cement concrete roadway.

(Write any THREE questions out of the remaining six.)

IV. What is sap wood ? What are the different processes of seasoning timber and give an outline of them ? What is the effect of varnishing unseasoned wood ? What are the qualities of good timber ? 10

V. (*a*) What is the safe permissible load on foundations in the case of following :—

(*a*) Average clay.

(*b*) Black cotton soil.

(*c*) Sand.

(*d*) Hard Murum.

(*e*) Laterite rock.

(*b*) Mention some of the difficulties which are generally met in foundations and the methods adopted to overcome the same. 10

VI. (*a*) Give specification for road metal for surface repairs.

(*b*) Write out a complete set of instructions for an inexperienced Overseer for carrying out surface repairs (including resurfacing) to a metalled road. 10

Marks.

VII. (*a*) What items are usually required to be done for road maintenance (*i*) during fair weather, (*ii*) during monsoon.

(*b*) What are the usual items of maintenance including special repairs in the case of Ghat portion.

(*c*) What are the various points of your inspection as regards the cross-drainage works of different kind. 10

VIII. Draw a dimensioned cross section from boundary to boundary of a major district road (metalled) giving dimensions and all the names of its various parts. (*i*) section fully in bank, (*ii*) section half in bank and half in cutting. 10

IX. (*a*) What precautions you will take from the point of view of safety of traffic at the various points of danger on your road. State the difficulties experienced by the traffic and how they would be removed.

(*b*) What is the purpose of providing camber and what camber is adopted for (*i*) asphalted surface, (*ii*) metalled road surface, (*iii*) concrete road surface. 10

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS.
BELGAUM
ROADS AND BUILDINGS (Oral).

Date, 28th June 1950.

Marks.

(*a*) What is super-elevation ? What purpose does it serve ?

(*b*) What do you mean by Ruling Gradient ? What Ruling Gradient you would adopt for a Bridge approach in a town ? What Ruling Gradient you would adopt for a Ghat Road ? For a District Road ? 5

2. (*a*) What function is served by soling of a road ?

(*b*) What is the usual thickness of soling for a road ?

(*c*) How do you lay the same and what are its advantages and disadvantages ? 7

3. (*i*) At the time of your inspection, you find that a considerable scour has been formed by the side of a pier of a cross-drain age work. What protective works you would propose ?

Marks.

(*ii*) At the time of your inspection, you find that the *nala* bed is cutting away one bank up-stream side of your cross-drainage work. What protective work you would propose ? 8

4. (*i*) State the different kind of metal available for surface repairs in your Division and what are its qualities ?

(*ii*) What are the different kinds of road wearing surfaces and pavements ? 8

5. (*a*) How would you prevent and minimize corrugation in a water bound macadam surface ?

(*b*) What is Traffic Census ? How is it taken and why ? 8

6. (*i*) What is the usual slope of a Mangalore tiled roof ?

(*ii*) How many Mangalore tiles are needed for 100 sq. ft. of roofing ?

(*iii*) How many country tiles are needed for 100 sq. ft. of single country tile roofing ?

(*iv*) Distinguish between purlin rafter construction and common rafter construction. 8

7. What are the Chief causes of cracks in structures and what steps would you take to prevent them ? 8

8. What precautions you take as regards foundations on soft soils ? What bearing pressure you would allow for foundations in black cotton soil ? 6

9. (*i*) How would you prepare the subgrade for laying cement concrete Roadway slab ?

(*ii*) What precautions you will take in storing cement during fair weather and during Monsoon ? 8

10. (*i*) You find that the road-water is entering your compound through the gate. What methods you would adopt to prevent this ?

(*ii*) How would you fix male and female hinges of a Gate Leaf to prevent its easy removal ?

(*iii*) What is the cause of blister in lime plaster and how will you prevent them ? 9

PROFESSIONAL EXAMINATION OF OFFICERS, B.S.E., CLASS I.
CENTRAL CIRCLE, POONA.

GENERAL ENGINEERING RULES AND BUILDINGS (Written).

Monday, 26th June 1950.

(Time : 11 A. M. to 2 P. M.)

All questions carry equal marks. Three Marks are reserved for neatness etc.

1. Describe any two types of :—
"Cast-in-siti ". R. C. Pilling.

Discuss their adoption for the following works :—
(*i*) For supporting a building 6 storeys high. The Ground consists of filled up unconsolidated material for a derth of 20′ below which hard murum is met with.

(*ii*) For supporting a pier of a bridge. The function strata consists :
15′—Sand.
10′—Compact clay :
Below—Hard clay mixed with Kankar.

2. Describe with the help of neat sketches the process of plugging a R. C. C. well of a bridge pier.
The depth of water in the well is about 50 feet.

3. A road culvert has a single span of segmental brick arch of 15 feet and of $\frac{1}{4}$ rise. The nalla is dry. There is 2 feet of cushioning over the crown. The culvert is safe for carrying an axle load of 5 tons only.

A heavy piece of machinery weighing 70 tons is to be transported over the culvert. It is mounted on a trailer having two pairs of axles. What precautions and remedies you will take to strength the culvert temporarily to pass this heavy load ?

4. It is necessary to construct small size masonry bandharas over nallas. Write down a set of instructions for their survey and design. Give a typical design of a bandhara for the following :—
Width of nalla.—50 feet.
Bank slope—2 to 1.
(Assume other suitable data).
Estimate the cost of such bandhara,

5. Describe structural properties of any three varieties of timber.

   How is timber graded structurally ?

   Draw a sketch showing a lap joint in a tie of a timber roof truss for a span of 40 feet. The truss is made of timber planks $1\frac{1}{2}'' \times 5\frac{1}{2}''$ and the members are connected by "Babul disc dowels".

6. Describe the burning of bricks in Trench killins.

7. Write short notes on :—
   (*i*) Baily bridges.
   (*ii*) Callandar Hamilton bridges.
   (*iii*) Small Box Girder Bridges.

8. Write down specifications for .—
   Concreting a R. C. C. floor of hall.—
   Data.—Main beams are 4 Nos. $\times 40' \times 3' \times 1\frac{1}{2}'$ spac at 15′ centre to centre.
   [Cross beams are 15 Nos. $\times 13\frac{1}{2}' \times 1\frac{1}{4}' \times 1'$
   slab.....inches thick.
   The concreting is to be done in 4 days (having two shifts a day) allowing $1\frac{1}{2}$ hour recess between the two shifts.
   Detail the position of construction joints in beams and slab and write detailed instructions for spacing and treating these joints.

9. What are the criterions for the stability of a retaining wall ?
   Design a stone retaining wall for the following data .—
   Earth level at top.
   Filling behind to consist of sand and clay.
   Height of wall 20 feet.
   Neglect ary resistance of the soil in front.
   The wall to be founded on solid clay mixed with the very find sand.

10. A work shop shed is to have a un-obstructed space of $200' \times 60'$.
    Show by diagramatical line of sketches the arrangement of asbestos sheet roofing on steel trusses, etc.
    Show especially the wind bracings.

11. Write short notes on—
    (*i*) Prestressed concrete beams.
    (*ii*) Guniting.
    (*iii*) Use of saline water in mixing concrete.
    (*iv*) Stabilised soil for house building.
    (*v*) Seasoning of Timber.

12. Write down a detailed specification and a Rate Abstract for 2nd class coursed rubble masonry.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I.

CENTRAL CIRCLE.

GENERAL ENGINEERING (Oral)

Monday, 26th June 1950.

(Time : 3-00 P. M. onwards.)

1. What are the safe permissible loads for the following soils :—
   (*i*) Black Cotton Spil.
   (*ii*) Alluvial earth, sandy loam.
   (*iii*) Compact Clay, nearly dry.
   (*iv*) Compact Sand.
   (*v*) Nankar.
   (*vi*) Murum.

2. What is the load that a 3 ton lorry carriers usually ?
   Cement bags.
   Burnt bricks.
   6′ long trafford Asbestos sheets.
   Stone metal $1\frac{1}{2}''$ gauge.
   Timber sleepers $6' \times 8'' \times 4\frac{1}{2}''$.

2. (*a*) What is the average consumption of petrol for such a lorry.

3. What are the following pipes made of and state their use :—
   (*i*) Armoo.
   (*ii*) Hume.
   (*iii*) C. I.
   (*iv*) Asbestos Cement.

4. What area of catchment will be drained by a slab drain of size $5' \times 3'$?
   What size of Hume pipe will be required for the same purpose ?

5. What are the field tests for steel reinforcement, if you have no test certificates ?

6. State a feaw cuses of leakages in R. C. C. terraced roofs and describe measures to prevent them.

7. What is the structural difference between a dome and an arch ?

8. What are the following :—
   Lahore Shed.
   Nissen Hut.

9. How does a rope ferry work ?

PROFESSIONAL EXAMINATION OF OFFICERS, B. S. E., CLASS I.

ROADS AND BUILDINGS (Written).

Wednesday, 28th June 1950.

(Time : 11-00 A. M. to 2-00 P. M.)

1. A road connects two important cities. It has at present a 12′ water bound macadam road surface maintained in a poor condition and the traffic is of the order of 1,500 tons per day. It is proposed to concrete the surface.

   Write down a preliminary project report discussing the ultimate economic value to the community (i. e. costs and benefits).

   Assume suitable reasonable data for length, cost of surfacing, rate of interest, useful life etc.

2. Write down a specification for a two and a half inch thick Full Grout Asphalt Macadam surface (without reconditioning surface).

3. What types of transitional curves are adopted on Modern Highways ?

   State their Geometrical properties and how the transition is effected.

4. Why is a superelevation necessary ?

   Describe the general formula for the same allowing for frictional resistance of the road surface.

   What superelevation will you give for a cement concrete road surface for the following :—

   Normal speed on straight road ... 30 M. P. H.

   Minimum radius of curvature ... 250 feet.

   Will you warn the traffic to reduce speed ?

5. What are the ideal conditions for siting a submersible bridge ?

6. Why is drainage of haunches and filling between head walls of arch bridges so essential ?
   How is it to be effected ?

7. The head walls of an old arch bridge are bulging out and the face rings of the arches are separating. What may be the causes of failure and what remedies do you suggest ?

8. Give the present prescribed values of live loads on floors of buildings as per specification of P. W. D. Bombay and compare the same as allowed in other modern codes.

   Domestic Buildings.

   Hospital wards.

   Class rooms in school buildings.

   What reduction of load on columns is allowed for in modern codes if the building has a number of storeys.

9. Draw a neat dimensioned plan for a bungalow moffusil for a Class I Officer.
   Give its estimated cost at plinth area rates and Cubic foot rates.

10. Write short notes on the following :—
   (*i*) Aqua Privy.
   (*ii*) Damp proof course.
   (*iii*) Double Shahabad flooring.
   (*iv*) Neeru plaster.
   (*v*) Hollow concrete block masonry.

11. Sketch a cantilever R. C. C. roof over a pavilion. Sketch details of reinforcement in the cantilevered beams.
   (No calculations of design are required).
   Data : The cantilever roof has a span of 25 feet.
   The roof slopes backward.
   Assume other suitable data.

PROFESSIONAL EXAMINATION OF OFFICERS, B. S. E., CLASS I.

CENTRAL CIRCLE.

ROADS AND BUILDINGS (Oral).

27th June 1950.

(Time : 3 P.M. onwards.)

1. What are the prevailing rates for the following :—
   (*i*) 1 : 2 : 4 Cement Concrete in the 1st floor of R. C. C. Buildings.
   (*ii*) Timber shuttering.
   (*iii*) Reinforcement.
   (*iv*) IInd Class coursed rubble masonry 18" thick faced with khandkies on one side.

2. Explain English bond by a sketch showing a corner of two brick walls joining at right angles. One wall being 18" thick and the other 13½".

3. What allowance is made for wind pressure in your area ? What precautions are taken to prevent blowing off Mangalore tiles from roof ?

4. What are the following :—
   (*i*) Catch water drain.
   (*ii*) Camber.
   (*iii*) Cross fall.
   (*iv*) Sub grade.
   (*v*) Soling.

5. How do you repair pot holes and patces in following road surfaces :—
   (*i*) Water bound macadam.
   (*ii*) Premixed (hot) asphalt macadam.
   (*iii*) Cement Concrete road.

6. Sketch a typical modern junction of two Express Highways, crossing each other at different levels.

7. What is the purpose of " Kentledge tests " in well sinking and how are these carried out ?

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, B. S. E., CLASS I.

26th June 1950.

PAPER I

GENERAL ENGINEERING—ELECTRICAL WORKS.

(Time allowed : 3 hours.)

(*N.B.*—Not more than 8 questions to be answered. All questions carry equal number of marks).

1. (a) Discuss the general advantages and disadvantages of :—
   (i) Direct lighting.
   (ii) Semi-Direct lighting ;
   (iii) Indirect lighting.
   (b) State in which classes of Government buildings you would recommend direct lighting, semi-direct lighting and indirect lighting. Give reasons therefor.

2. (*a*) What is your experience of V. I. R. Cable, C. T. S. wire and lead-covered wire so far as efficiency and durability are concerned ?

(*b*) Which type of wiring you would recommend at the following places :—

(i) Government House, Bombay ;
(ii) Government House, Ganeshkhind, Poona ;
(iii) Government House, Mahableshwar ?

Give reasons for your answer.

3. (*a*) Explain in detail how you would check the efficiency of the earthing system employed in an electric installation.

(*b*) What, in your opinion, are the most important points to be attended to in earthing an installation using metal conduit wiring ?

4. Explain in detail the protective devices used on lift installation for preventing accidents. Give diagramatic sketches of connections of these devices.

5. (*a*) What is the average life of a storage battery ?
What are the factors which tend to shorten the life of a battery ?

(*b*) Explain how voltage regulation is done in an installation using storage battery.

6. Describe briefly some of the most common automatic operating devices used on D. C. and A. C. Circuits. Give diagrams of connections of the relays employed in such devices.

7. What are the special advantages of electric drive over drives by other means ? Discuss the advantages and disadvantages of group and individual driving in an industrial installation.

8. (*a*) Explain why two part tarrifs are generally used by a licensee in charging for electrical energy.

(*b*) A consumer has a maximum demand of 12 K. W. The licensee has two alternative tarrifs, namely :—

(i) a fixed charge of Rs. 80 per annum, plus a running charge of half anna per unit, and

(ii) a charge of 4-1/2 annas per unit for the first 115 units, [illegible] of this one anna per unit.

9. (*a*) What is the difference in the construction of in-door and out-door transformers ? Describe the different methods of cooling a power transformer.

(*b*) A power transformer rated for 400 KVA. is designed for a temperature rise of 40 degrees centigrade over an ambient temperature of 40 degrees centigrade. If the same transformer is used in an ambient temperature of 35 degrees centigrade, determine to what extent the transformer can be loaded over its rated capacity. The iron and copper losses of the transformer at full load are 2,050 watts and 4,820 watts respectively.

Calculate the efficiency of the above transformer at half load and 8 power factor.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS. B. S. E. (CLASS I.)

CENTRAL CIRCLE.

Tuesday, 27th June 1950.

Particular Subject:—ELECTRICAL ENERGY AND INDIAN ELECTRICITY ACT.

(1) What is the definition of a street according to the Indian Electricity Act ?

(2) What would be the testing pressure for an apparatus rated for :—
(*a*) 600 Volts.
(*b*) 6,600 Volts.
(*c*) 33,000 Volts ?

(3) What are the stipulations according to Indian Electricity Rules regarding height from ground and distance from building, for construction of an aerial line ?

(4) How do you get speed variation in—
(*a*) D. C. Motor.
(*b*) A. C. Motor ?

(5) Why is a star/delta connected transformer preferable to Star/Star connected transformer in a distribution system ?

(6) (*a*) What is the maximum earth resistance you would ordinarily allow ir an electric installation ?
(*b*) How would you ensure protection against shocks at places where low earth resistance is not possible ?

(7) How would you provide protection for (*a*) extra high tension aerial lines of 1,10,000 volts ?

(8) (*a*) What is the percentage of variation permitted by the Indian Electricity Rules in the declared voltage and frequency ?

(*b*) Why are the limits different in High Tension and Low Tension systems ?

(9) (*a*) Is it possible to provide electrically operated clocks on D. C. Supply ?

(*b*) What is the difference between electrical clocks working on D. C. and A. C. ?

PROFESSIONAL EXAMINATION OF OFFICERS OF THE B. S. E., CLASS I.

CENTRAL CIRCLE.

Subject.—**ACCOUNTS AND RULES OF THE P. W. D. (Written.)**

Tuesday, 27th June 1950.

(Time:—11. A. M. to 2 P. M.) Marks.

1. (*a*) What do you mean by a Survey Report ? 3

(*b*) Write such a Survey Report for the following articles, with reasons and remarks :— 6

18 hammers—cost Rs. 1-4-0 each, purchased 8 years ago.

25 buckets—cost Rs. 1-12-0 each, purchased 4 years ago.

1 easy chair—cost Rs. 60, purchased 10 years ago.

1 cup and saucer—cost Rs. 1-8-0, purchased one year ago.

2. Describe the procedure to be followed in the case of— 6

(*a*) A P. W. D. cheque lost by a contractor.

(*b*) A receipt for deposit lost by the depositor.

(*c*) A time-barred P. W. D. cheque.

3. Explain the following :— 10

(1) What is the currency of a P. W. D. cheque ?

(2) What is the minimum amount below which a P. W. D. cheque cannot be drawn ?

(3) Administrative approval.
(4) A Transfer Entry Order.
(5) Recoupment of Imprest.
(6) Earnest money.
(7) Workslip.
(8) A major work.
(9) A sub-head.
(10) A Hand Receipt.

4. (*a*) What are the different forms of contract and when each of them used ? 8

(*b*) What is the procedure to be followed when a tender other than the lowest is to be accepted ?

5. Under what heads of Accounts (such as original works, special repairs, etc.) would you classify the following works :— 10

(1) Raising banks of an existing canal for allowing more water to pass.
(2) Oil-painting the walls of a building in place of the old distempar.
(3) Removing decayed wood-work, replacing it by a new one.
(4) Removing old flower-beds and preparing new ones in a Government garden.
(5) Dismantling a paved dip on a road and replacing it by a submersible bridge ?

6. When is a revised administrative approval necessary ? 5

7. What is a secured advance and when and to whom is it given ? 5

8. What is a per contra recovery ? 5
Describe how you will enter such recovery in the cash book.

9. Give a complete list of documents required to be submitted by an S. D. O. along with his monthly accounts. 9

10. (*a*) You anticipate an excess over an estimate at the very commencement of the work. What action will you take ?

(*b*) What action will you take when you anticipate a large saving on a sanctioned estimate ? 8

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PROFESSIONAL EXAMINATION OF OFFICERS OF THE B. S. E., CLASS I.

CENTRAL CIRCLE.

Subject :—**ACCOUNTS AND RULES OF THE P. W. D.**

(Oral.)

Wednesday 28th June 1950.

(Time : 3 P.M. to 6 P.M.)

Marks.

1. What percentages deductions are necessary in the following cases :—
   (1) Hard murum.
   (2) Metal $1\frac{1}{2}''$ to $2''$ size.
   (3) Sand.
   (4) Soft murum. 8

2. What are the following :—
   (1) Remittance Transfer Receipt.
   (2) Advance payment.
   (3) Pre-audit and Post-audit.
   (4) Standard Messurement Books.
   (5) Contingencies.
   (6) Crossed cheque. 12

3. What is the procedure for acquiring land for the Public Works Department ? 5

4. In the case of an old Government building, the following changes have been made :—
   (1) An old 6 feet wide verandah is made 10 feet wide.
   (2) Old country tiled roof is changed into a Mangalore tiled roof.
   (3) Old decayed windows are replaced by new ones. State how each of these items will affect the capital value of the building. 9

5. What are the financial responsibilities of a Divisional Officer ? 6

6. (*a*) What do you mean by "security for Performance of contracts ? 3
   (*b*) In how many different ways can this security be taken ? 8

7. In what circumstances can a Government land, in the Possession of Public Works Department, be sold ? 4
   Describe the procedure of selling such a land 4

8. What are the initial records on which the accounts of works are based ? 8

9. What are the different forms of Bills and Vouchers ? 8

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PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE, POONA 1.

GENERAL ENGINEERING (ROADS AND BUILDINGS) (Written).

26th June 1950.

(Time : 11 A.M. to 2. P.M.)

(*N. B.* :—All questions carry equal marks. Three marks are reserved for neatness etc.)

1. Distinguish between the following :
   (*i*) Ordinary Portland Cement.
   (*ii*) Rapid hardening Portland Cement.
   (*iii*) Quick settling Cement.
   (*iv*) Low Heat Cement.
   (*v*) Expensive Cement.

2. State the Law of Water Cement Ratio.
   Describe a method of proportioning of concrete mix for a particular strength with reference to this Law.

3. A temporary crossing is put across a river in November, the Crossing should be designed to pass a 10 ton loaded truck.
   Maximum depth of water=5 feet.
   Width of streem=150 feet.
   Bed consists of sand.
   Draw sketches showing a typical design.
   What are the usual requirements of maintenance during working season ?
   What difficulties are generally experienced at the time of erecting such a structure ?

4. Give a typical design of well for water supply in a small village. The strata consists of :
   0′ to 15′ = Redish Soil.
   15′ to 20′ = Clay.
   20′ to 25′ = Clay mixed with sand.
   25′ to 40′ = Compact Clay.
   40′ to 50′ = Water bearing sand.

5. Write down a set of instructions for the guidance of the Overseer supervising blasting operations in a stone quarry.

6. Design a small R. C. C. water tower having a tank of 5,000 gallons capacity.

7. Draw a dimensioned sketch showing septic tank suitable for a small bungalow.

8. Draw a plan (looking from top) of a skew
Brick arch of pan 10′ and rise 2′ ; thickness of ring being 18″.
Show a few lines of courses.

9. Write short notes on :
(*i*)Soil stabilization.
(*ii*) Consistancy of concrete.
(*iii*) Shakes in timber.
(*iv*) Fillet and Butt welds.
(*v*) Disc dowels of babul.
(*vi*) Rawl plugs.
(*vii*) Sheet piling.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE, POONA 1.

GENERAL ENGINEERING (ROADS AND BUILDINGS) (Oral).

Wednesday, 28th June 1950.

(Time : 11 A.M. onwards.)

1. What are the main requirements of the ordinary grade and high grade concrete ?

2. How do you roughly find out the discharge of a stream in flood by actual observation ?

3. A stone masonry arch of 30 feet span is complete. How will you lower the centering and remove the steel trusses ?

4. How are the following measured for purposes of payment ?
(1) Distempering walls.
(2) Reinforced concrete in beam and slab.
(3) Rubble Stone.
(4) Spreading metal for a 2″ layer for resurfacing.

5. What are the weights of the following ?
(i) Reinforced concrete.
(ii) Teak Wood.
(iii) Mangalore Tiles.
(iv) An asphalt drum (full).

6. How are the rises and treads of a stair-case determined ?

7. What are the safe permissible loads on :—
(1) 1st Class brick masonry.
(2) Cement concrete 1 : 3 : 6 Mix.
(3) 2nd Class coursed rubble masonry.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE, POONA 1.

GENERAL ENGINEERING (ROADS AND BUILDINGS) (Oral).

Wednesday the 28th June 1950.

(Time : 3 P.M. onwards.)

1. How are the following measured for purposes of payment?

   (i) Doors and Windows complete.

   (ii) Coal received in Railway wagons.

   (iii) Stone khandkies.

   (iv) Rolled steel sections.

2. What is expected bulkage in the following ?

   (i) 1 : 2 : 4 cement concrete.

   (ii) 1 : 2 : 5 : 5 Cement concrete.

   (iii) Sand slightly wet.

   (iv) Sand completed saturated.

3. What is the area of the waterway of a drain of road to pass a flood discharge from a catchment of 64 acres ?

4. How will you hoist and erect in position a steel roof truss weighing 2 Tons ?

5. What are the safe permissible loads in :

   (i) Black Cotton Soil.

   (ii) Alluvial sandy loam.

   (iii) Soft rock.

   (iv) Hard rock.

6. What are the usual fittings of a first class doors ? What is a parliamentary hinge ?

7. Sketch a course of a 18" square brick pillar.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE, POONA 1.

GENERAL ENGINEERING (ROADS AND BUILDINGS) (Oral).

Thursday, 29th June 1950.

(Time : 11 A.M. onwards.)

How are the following measured for purposes of making payment ?
(*i*) A fabricated rivetted steel roof truss.
(*ii*) An earthen road embankment.
(*iii*) Asbestos cement roofing sheets.
(*iv*) G. C. I. roofing sheets.

2. How do you proceed to acquire land for public purposes ?

3. Name any two machines used for moving earth.

4. What are the following :—
(1) Temping Mining bar.
(2) Sledge Hammer.
(3) Lewis Bolt.
(4) Turn buckle.
(5) Foot valve.
(6) Counter sunk rivet.

5. What are the safe permissible stresses in mild steel reinforcement.
(*i*) for direct tension.
(*ii*) for direct compression.
What maximum stress in tension will you allow in the steel of welded fabric like Maxweld ?

6. How is rainfall measured ?
(*ii*) What are Isohyets ?
(*iii*) What is the maximum intensity of rainfall in one hour expected in your area ?

7. Describe a typical arrangement for drawing water from a small well. The water surface is about 15 feet below the ground level. The well is built up only up to 8 feet and below this it is exacavated in hard muram and soft rock.

8. Show by sketches courses of a flat brick arch and a segmental relieving brick arch over a door.

PROFESSIONAL EXAMINATION OF P. S. E., CLASS II.

CENTRAL CIRCLE, POONA 1.

ROADS AND BUILDINGS (Written).

26th June 1950.

(Time : 3 P. M. to 6 P. M.)

All questions carry equal marks. Five marks are reserved for neatness.

1. State the various survey data and other information that is to be collected for the preparation of plans and estimates of a Major Bridge ?

2. Write down a detailed specification for renewing a water bound macadam surface.

3. Write down a specification for mixing concrete by hand.

4. What is " Star and Grid " system of planning road systems ?

   Give the classification of roads according to their importance.

   What are the funds from which original works on Roads are financed ?

5. Discuss the importance of drainage of roads.

6. What are vertical curves ?
   What is a " Shock proof " curve and what is a " Hump ".

7. Draw a neat sketch of an asbestos cement roof 20′ span with detached verandha of 8 feet.

8. Write down specifications and rate abstracts for :
   (*i*) Polished Tandur or Shahabad flooring ;
   (*ii*) Indian Patent stone flooring.

9. A plain cement concrete arch 2′—3″ thick, having span of 40 feet and rise 10′ is to be concreted in situ. No allowance for shrinkage stresses is made in the design.

   Describe how the concreting will be carried out with a view to reduce shrinkage to minimum.

10. What precautionary measures are taken to protect timber from " White ants " ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE, POONA 1.

ROADS AND BUILDINGS (Oral).

Thursday, 29th June 1950.

(Time : 3 P. M. onwards.)

1. What are the following joints in a cement concrete road ?
   (i) Contraction joints.
   (ii) Expansion joints.
   (iii) Dummy joints.
   What is the usual distance at which they are spaced apart ?

2. (i) What is the difference between "Full grout" and "semi-grout".
   (ii) What is the difference between "Surface Dressing" and "Carpet".

3. What are the usual rates or maintenance grants for the following :—
   (1) Asphalt macadam surface.
   (2) Cement concrete road.

4. (1) State a few of the important items of mainteanance of a masonry bridge.
   (2) While inspecting such a bridge, what particular points you will look for ?

5. A localised strong spring is met with in a foundation trench. How will you concrete the footings without allowing the marter to be washed off.

6. An inspection Bungalow is provided with tap water. Describe a typical bath room detailing the positions of taps, towel bars etc. (No bath tub is to be used). How will the water be disposed off ?

7. State the minimum period after which forms can be struck for the following :—
   (i) R. C. C. beams.
   (ii) R. C. C. slab.
   (iii) R. C. C. column.

8. Describe how a China-Mosaic flooring is laid.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B.S. E., CLASS II.

CENTRAL CIRCLE, POONA 1.

ROADS AND BUILDINGS (Oral).

Friday, 30th June 1950.

(Time : 11 A.M. onwards.)

1. What are "CRETEWAYS"and how are these constructed ?
2. What are the following ?
   (1) Road Dam.
   (2) Water table.
   (3) G. T. S. B. M.
   (4) Hair Pin Bend.
   (5) Collapsible Apron.

3. What are the permissible stresses for teak wood and cement concrete 1 : 2 : 4 nominal mix.
   In tension.
   In compression.
   In shear.

4. What is a balanced contilever bridge and how does it differ from a continuous Girder Bridge ?

5. A reinforced concrete beam for a hall has a span of 30 feet. In the plans, the main bars of 1" diameter were provided without any lap joint. During construction, longer bars of 36 feet were not available and only 1" diameter bars of 18 feet lenght were obtained and used. What changes in the design and precautions during construction were necessary due to this change ?

6. What is a "Lightening Conductor" ?
   How do you prepare "Earth" for it ?

7. What are the usual scales for the following maps and drawings ?
   (1) Topo sheets.
   (2) Degree sheets.
   (3) Village maps.
   (4) City Survey Index sheets.
   (5) City Survey detailed sheets.
   (6) Line plans for buildings.
   (7) Detailed plans for buildings.
   (8) Plan and Longitudinal Section of roads.
   (9) Cross Sections of roads.
   (10) Contour plan for a bridge site.

8. Show by sketches a typical arrangement of shutterings for a R. C. C. Tee-beam and slab floor of a building. Show at least two beams.
Show also the details of a construction joint between the rib and the slab.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS OF THE B. S. E., CLASS II.

CENTRAL CIRCLE

GENERAL ENGINEERING IRRIGATION (Written).

Monday, 26th June 1950.

(Time : 11 A. M. to 2 P. M.)

1. (*a*) What is a standing wave flume ?

   (*b*) Give a sketch plan and a longitudinal section of a Standing Wave Flume having a throat width of 3 feet and depth of water equal to 2·0 feet over the hump.

   (*c*) What maximum water level can be allowed downstream of the Standing Wave Flume in the case of (*b*) above and why ?

   (*d*) What will be the discharge for the conditions mentioned in (*b*) above ? 12

2. A canal has got the following dimensions :—
   Bed width 30 feet.
   F. S. D. 7 feet.
   Inside slopes 2 : 1.
   Discharge 450 cusecs.
   Make a sketch plan, showing how you will take this canal on an aqueduct, showing the earthen canal on both sides and the aqueduct. 12

3. Describe (No sketch required) :—
   (1) A module.
   (2) A semi-module.
   (3) A waste weir.
   (4) An automatic gate.
   (5) An automatic level recorder. 10

4. What are Escapes and why are they necessary ?
   In what circumstances are they required to be used. 6

5. What do you mean by subsoil survey and what information is collected by such a survey ? Marks

How is this information used in actual practice ? 6

6. Explain the following :—
(1) Water table.
(2) A fall.
(3) Critical velocity.
(4) Afflux.
(5) Free Board 10

7. What are the different Irrigation seasons ?

From what date to what date each season exist ? Mention a few crops of each season. 9

8. What do you mean by :—
(1) A. I. D. C.
(2) Duty.
(3) Duty on cane basis.
(4) Losses in transit.
(5) Preliminary Programme of Irrigation. 10

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS OF THE B. S. E., CLASS II.

CENTRAL CIRCLE.

Subject :—**GENERAL ENGINEERING IRRIGATION (Oral).**

Tuesday, 27th June 1950.

(Time : 3 P. M. to 6 P. M.)

1. What are the reasons for silting up of a distributary ? What precautions will you take while repairing such silted up distributary ? 10

2. What do you understand by " supply of water by volumetric basis " ?
How is this supply measured ? 9

3. What do you mean by :—
(1) Khodwa or 1st ratoon.
(2) Nidwa or 2nd ratoon.
(3) Follow on crops.
(4) Remissions.
(5) Hydroisobath. 10

Marks.

4. How will you reclaim a water-logged area ? What are the principles to be observed ? 8

5. Describe how you will gauge the discharge of a canal, 50 feet wide. 8

6. You have to design a new distributary. What points will you take into account for doing this ? 10

7. What will you do as soon as you learn that the canal in your Charge has breached ? 10

8. What are the following :—
(1) Adsali cane.
(2) Overlap.
(3) A sugar cane block.
(4) Record of Rights.
(5) Protected Tenant. 10

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PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS OF THE B. S. E., CLASS II.

CENTRAL CIRCLE

Subject :—**IRRIGATION—IRRIGATION ACT. (Written).**

Monday, 26th June 1950.

(Time : 3 P. M. to 6 P. M.)

1. What is the definition of a " Canal " according to the Irrigation Act ? 15

Under what conditions can a Canal Officer act as an arbitrator for settling disputes about rights and liabilities of persons interested in a water course ? 10

3. Describe the procedure under the Irrigation Act, for obtaining labour for urgent work of repairs. 10

4. On the 15th of February in a year you have a balance of 11,500 Moft. in your Tank—Prepare a preliminary—Irrigation Programme for the following crops :—
Sugar Cane—20,000 acres.
Fruit and other Perennials—500 acres.
Bhusar such as fodder etc. 2,000 acres.

Marks

Assume suitable figure for :—
(1) Losses due to absorption and evaporation.
(2) Losses in transit.
(3) Duties for the different crops.
The programme should be for the period 15th February to 14th June. 15

5. How are water rates charged when well water and canal water are conveyed in the same channel ? 7

6. What do you mean by " exemption of blocks " from water rates ? 6

7. What is meant by " Cancellation of blocks " and in what circumstances is this done ? 6

8. (*a*) Describe in brief the different circumstances in which you hold Panchnamas.
(*b*) Describe the procedure of making such Panchnamas and how they are finally dealt with. 6

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS OF THE B. S. E., CLASS II.

CENTRAL CIRCLE.

Subject :—**IRRIGATION AND IRRIGATION ACT (Oral).**

Friday, 30th June 1950.

(Time : 11 A.M. to 2 P.M.)

1. What duties will you adopt in designing a Distributary for the following crops :—
(1) Rice
(2) Sugarcane.
(3) Wheat.
(4) Monsoon crops. 12

What are the obligation of owners of water courses ? 10

3. What are the present restrictions on the use of pazar water for growing seasonal crops ? 6

4. (a) What is the water rate leviable on late applications for seasonal crops ? 5

(*b*) Can such a water rate be reduced ? If so how ? 5

5. How can labour be obtained for canals on emergencies ? 10

Marks.

6. What do you mean by :—
   (1) Delta.
   (2) Cusec.
   (3) Stop gates.
   (4) Water cushion.
   (5) Rotation. 10

7. What is a superpassage and why is it necessary ? 7

8. How many waterings are required by the following crops ?
   (1) Sugar cane.
   (2) Jowar.
   (3) Bajri.
   (4) Rice.
   (5) Wheat. 10

75

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE, POONA:

GENERAL ENGINEERING (LAND DRAINAGE) (Written).

Monday, 26th June 1950.

(Time : 11 A. M. to 2 P.M.)

All questions carry equal marks.

3 marks are reserved for neatness.

1. Describe the manufacture of lime in a kiln.

2. Write down a specification and a Rate Abstract for " Brick Nogging ".

3. Draw neat drawings showing a typical manhole with brick walls. The invert of the outlet pipe is 10 feet below the general ground level.

4. A Major District Road crosses a nalla which has been trained to act as an open drain. Compact sand mixed with clay is met with at 3 feet below the bed. It is proposed to construct a small slab drain having a clear opening of 10′ x 6′. Draw dimensioned drawings or neat sketches showing the details of the proposed slab drain.

5. A trench is to be excavated in wet black soil to lay a pipe drain at about 8 feet below the ground level. Show by sketches timbering of the trench.

6. How is the maximum run off estimated ?
   What is the maximum flood discharge you expect from a catchement of 25 square miles ?

7. Give a detailed specification of preparing lime mortar and a Rate Abstract for the same.

8. State any standard formula for finding out flow in an open channel and find out the discharge of an open drain having the following:—

Section	Trapizoidal.
Bed width	10 feet.
Bank slopes.	3 to 1.
Bed fall	1 in 1000.
Depth of water.	8 feet.

The channel is in earth in average regimen.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE, POONA.

GENERAL ENGINEERING (LAND DRAINAGE) (Oral).

Tuesday, 27th June 1950.

(Time : 3 P. M. onwards.)

1. What are the coefficients of rugosity for the following:—
   Channels of glazed pipes.
   Coursed brick work.
   Rivers and canals in earth below the average order.
   Canals in rock cutting.

2. What is " Surkhi " mortar and where it is used ?

3. State and describe the operation of a few useful tools used for sub-surface exploration.

4. What are the prevailing rates in your Sub-Division ?
   (1) Petrol.
   (2) Bricks.
   (3) 1½" to 2" gauge stone metal.
   (4) Timber ballies 5" average diameter.

5. How is Nayla pointing done ?

6. How are the Asbestos Cement Trafford sheets laid on the roof ?

7. What lime you use for white washing ?
   Where do you obtain it from ?

8. What are the following ?
   (*i*) Knots in Timber.
   (*ii*) Honecombing in concrete.
   (*iii*) Blisters in lime plaster.

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS OF THE B. S. E., CLASS II.

CENTRAL CIRCLE, POONA 1.

LAND DRAINAGE (Written).

Monday, 26th June 1950.

(Time : 3 P.M. to 6 P.M.)

[All questions carry equal marks—5 marks are reserved for neatness.]

1. Give a brief Geological account of the formation of the soils in the Deccan Canal area.

2. Draw a neat typical cross section from hill top to the river showing therein the different substrata usually met with.

3. (*a*) What are the kinds of moisture affecting plant growth.
   (*b*) What are the factors affecting rise of sub-soil water in the Deccan Canal area.

4. Explain the recouperation formula and its bearing on the design of drains.

5. What survey data needs to be collected for locating drains ?

6. How do you estimate the expected discharge to be passed through a sub-soil drain ?

7. Write down a specification for an open trench drain.

8. Draw neat sketches showing a typical standing wave Flume Fall.

9. Give the physical characteristics of any two of the following soil types :—
   (1) Coarse Murum.
   (2) Soft Murum.
   (3) Man.
   (4) Chopan Block.
   State the names of a few weeds grown in them.

10. What are the steps taken to bring the reclaimed land under cultivation.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE, POONA 1.

LAND DRAINAGE (Oral).

Friday, 30th June 1950.

(Time : 11 A.M. onwards.)

1. State average recouperative values of the following soil materials :—
   Murum ————————
   Man ————————
   Fissured clay ————————

2. Give some average costs per acre and period for reclaimation of damaged land with the following soils :—

Soil Type.	What is expected nature of damage.	Cost per acre.	Suitable costs.	Period of reclaimation.
1. Exposed Murum or light soil ...				
2. Fine black soil ...				
3. Chopan Black soil difficult to improve.				
4. Stiff Chopan ...				

3. By what test is the strength of bio-chemical activity indicated ?

4. What are :—
   (1) Carrier drain ?
   (2) Relief drain ?
   (3) Intercepting drain ?

5. Is the drain water suitable for Pazer Irrigation ?

6. What are the maximum percentage of the following salts in soil permissible for agricultural growth ?

   $Na_2 SO_4$

   Na Cl

   $Na_2 CO_3$

7. In a test bore results, it was recorded as follows :

Depth below Ground.				Strata met with.
0′ to 3′	...	...	...	Black soil.
3′ to 8′	...	...	...	Murum.
8′ to 10′	...	...	...	Sand.

Is there any discrepancy ?

8. What is " Dionic Water Tester " ?

). What is a" Kar " ridge ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE.

GENERAL ENGINEERING CONNECTED WITH SANITARY ENGINEERING (Written).

Date : 26th June 1950.

(Time : 11 A. M. to 2 P. M.) Marks.

1. Design a R. C. floor slab over a pure water sump having clear inside size 30′ × 16″ to house 3 Nos. if directly coupled electric motor and pump with accessories, each set weighing 18 Cwts. and occupying 6′ × 4′ space excluding starters etc. Thickness of masonry wall of the sump is sufficiently strong to take all loads. Give your calculations. Draw the section of the roof slab ? 12

2. What labour will you require for laying and jointing 15″ dia. hume concrete pipe line 1000 ft. long in a prepared trench. Work out the cost of labour and material other than cost of pipes and collars ? 9

3. Name the important materials you will regularly require to run a water works having rapid gravity filter plant and oil engine driven pumping sets.

(*b*) Work out the quantity of various chemicals and oils required for one month's working of the above plant, assuming raw water reaching the plant by gravity and daily supply of 1.2, million gallons. Pure water is pumped daily into the elevated reservoir being 60 ft. above the F. S. L. of the pure water sump. 10

4. Draw up a short specification for the work of laying and jointing 6″ dia. to 12″ dia. S. W. Pipe sewers. Marks. 9

5. Give diamentioned sketches from which fair plans and estimate can be prepared for a mechanical egnineer's bungalow. Engineer's scale of pay is Rs. 300-20-500. 9

6. Write short notes on 5 of the following :—

(a) Hydraulic gradient in a rising main.
(b) Dry refuse.
(c) Chloromine treatment of water.
(d) Fire hydrant.
(e) Waste not cock.
(f) Sewage is a complete manure,
(g) Low level service reservoir 9

7. A jack well 20 ft. in dia. 62 ft. deep below ground is to be constructed at Nadiad. The trial bore shows following strata :—

12 ft. black cotton soil.
20 ft. man soil below.
26. ft. loose white and yellow soil.
and 4 ft. dry sand.

State how will you proceed to construct the Jack well. If sinking operation is decided at any stage, give the dimensioned sketch of the R. C. Curb you will require. Work out the quantity of steel, other than what is required in the R. C. Curb, necessary to complete the well. No roof slab is necessary (Wt. of steel 0.28 lbs. per cubic inch.) 10

8. Prepare a detailed estimate with present day rates for the inspection chamber as per drawing attached ? 9

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE.

GENERAL ENGINEERING CONNECTED WITH SANITARY ENGINEERING (Oral).

Date : 28th June 1950.

1. Quote rates prevalent in your district for—
(*a*) Laying and jointing 9″ dia. C. I. Pipe excluding all materials.

(*b*) Laying and jointing 12″ diar : S. W. sewer including jointing material.

(*c*) High Speed diesel oil.

(*d*) Excavation in hard rock by chiselling for sewer trenches.

(e) Alum per ton.

2. What dose of alum is generally used during fair weather at a filtration plant, raw water being obtained from an impounded reservoir PH Value of water is 7 : 3. Give the quantity of alum required per month for a discharge of of 1.4 million gallons.

3. What is the essential difference in the method of preparing lime and cement concrete ? What is vibrated concrete ? Where will you use it ?

4. What do you understand by 'A' 'B' 'C' and 'D' Class of C. I. pipes. What is their test pressure and for what working pressure will you adopt them?

5. What annual M and R. percent. charges will you adopt for the following works :—

S. W. pipe sower.

C. I. distribution system.

Water Meters.

Engine House,

Electric at pumping machinery.

6. What surface area and Cubic space will you provide for a secondary School Class room for 30 students ? What is the best orientation for a School building.

7. What is a porous pipe gallery ? How these pipes are made ? What diar of pipes will you consider suitable for the purpose ? What is the area of infiltration available per foot length of this pipe ?

8. For a newly intalled pumping plant driven by oil engine of 200 B. H. P. What crude oil consumption per W. H. P. hour will you allow for efficient maintenance ? Give the requirments of oil of the above plant for hours running ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEER, B. S. E., CLASS II.

CENTRAL CIRCLE.

SANITARY ENGINEERING (Written).

Date : 26th June 1950.

(Time : 3 P. M. to 6 P. M.)

Marks.

How is rainfall measured ? Describe the apparatus used for the purpose. A ghat catchment area of 200 Sq. miles in Western India has an average rainfall of 100 inches in 4 months of the monsoon. Calcutta the total run off in million cubic ft. expected. State for what maximum capacity you will design a lake for this run off. 10

2. Describe the sewage purification plant you will adopt for a a Suburban town, having a population of 2,00,000. To the East of the Suburb and the City is a main river which has very little flow during summer. The main city is likely to grow in all 3 directions. (*b*) If it is proposed to use the effluent from the plant for irrigation what area of land will you provide ? 9

3. Name the various types of latrines in use in the Bombay State. Where will you recommend the use of Aqua Privy ? Give a sketch of a two seated aqua privy block ? 9

4. Give the names of various types of pipes used in a sewerage system. What minimum dair : of pipe you will use for a lateral sewer. Give reasons for your selection. 9

5. It is proposed to provide mechanical rapid gravity filtration plant for Mourt Abu. Raw water gravity main enters the purification works on a small hillock at R. L. 4050. Capacity of the filters proposed is one million gallons per day.
Sketch out in section the design of your proposed purification works giving various levels and state clearly the F. S. L. of the pure water storage tank. 10

6. Describe the following and state their use :-
(*a*) Sluice valve
(*b*) Reflux valve
(*c*) Venturi meter
(*d*) Gully trap
(*e*) Foot valve
(*f*) W. C. Pan.

Marks.

7. What standard of purity you will lay down for a good potable water. Specify the quantities indespensible for its acceptance as such ? 9

8. What is sludge gas ? Give its analysis. What is its Calorific Value. How much electrical energy can be generated per day from a sludge digestion plant to which sewage from 150,000 pople is connected ? 10

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS B. S. E., CLASS II.

SANITARY ENGINEERING (Oral).

30th June 1950.

1. Give approximate quantity of various forms of Nitrogen in a domestic fresh sewage of a town having a water supply rate of 36 gallons per head per day.

2. Give Hazen and William formula for discharge of water in pipes. What value of ' C ' will you adopt in this formula for new hume steel pipes and C. I. pipes 30 years old ?

3. What is an outfall sewer ? Of what material it can be constructed for a town like Poona having a population of 3,00,000 at the time of design ?

4. What minimum gradient will you adopt while laying 6", 9" and 12" diar. sewer and why ?

5. What is (1) a shallow well ? (2) a deep well ? (3) artesian well ? How will you make use of the third for water supply to a village ?

6. Describe shortly the methods of testing pipe sewer.

7. What materials will you use for jointing 144 ft. length of 9" diar. S. & S. C. I. pipes under water, each pipe being 12 ft. long. Give the quantity of each material ?

What is free-chlorine in water ? What quantity of this will you recommend in your water at the water works end ? How will you check this readily ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE.

GENERAL ENGINEERING CONNECTED WITH BORING (Written).

26th June, 1950.

(Time : 11-00 A.M. to 2-00 P.M.)

1. Compare steam engine driven and oil engine driven boring machine stating advantages and disadvantages of each ? Give average life of these with normal use ? Give cost of a good type rotary drill capable of drilling 6″ diar. bore in hard strata upto 400 ft. ? 9

2. (*a*) What causes slip in belts in power transmission ? How much would you tolerate ?
   (*b*) What do you understand by—
   (*i*) Soft soldering (*ii*) Silver soldering (*iii*) Brazing. 9

3. Write Short notes on :—
   (*i*) Gas welding (*ii*) Electric welding. 9

4. Sketch and explain 3 types of leather belt fixtures and explain briefly which method you will prefer in a particular case. 9

5. Compare and contrast the use of reveting and welding for a 4,000 Gallons water tanks ? Give the advantage and limits of each method. 9

6. How are large size C. I. pipes manufactured in a big factory ? To what pressure you will test a ‘ C ’ Class C. I. pipe and by what method ? 9

7. Work out monthly running cost of pumping water for 8 hours a day for pumping 20,000 Gallons per hour from a 300 ft. deep 10″ diar. bore, static water levelling 30 ft. below ground and water to be pumped into a tank with F. S. L. 3 ft. above ground.
   (*i*) by compressed air lift compressor being driven by electric motor.
   (*ii*) by electric driven bore hole pump.
   Rate of current 0.75 annas per unit (No supervision charges or interest and depreciation to be assumed) ?

8. What is the difference between a Turet and a capstan lathe ? Give an example of job best done on each of these lathes.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE.

GENERAL ENGINEERING CONNECTED WITH BORING (Oral).

27th June 1950.

1. What are the present day wages of Senior Carpenter, turner, welder, Workshop Manager, and Boring Operator.

2. Which type of coke you will prefer for a foundry ? Why ?

3. How much good quality coal is required to generate 1 W. H. P. hour ? What is the Calorific value of coal, crude oil and sludge gas ?

4. How many Cubic feet of Coke comes in a cart load ? How many 9" diar. 12 ft. long pipes will go in a cart load assumping good road ?

5. What is a hydraulic gradient ? How do you measure this for a rising main and a gravity main ?

6. Name the different types of Saws and what job is best done on each.

7. What do you understand by Heavy diesel, High speed and light diesel oil ? What they are best used ? What are their prices per ton ?

8. What precautions you will take while poring molten metal in a mould and why ? What is good temperature of metal while pouring ?

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS, B. S. E., CLASS II.

BORING (Written).

26th June 1950.

(Time : 3 P. M. to 6 P.M.) Marks

1. Write out an order in detail for purchasing 2 Nos. of 22 W Ruston Bucyrus percussion type oil engine driven boring machine required for artesian boring in North Gujarat area where soil is alluvial. Orders should contain requirements of a l'tools and special materials necessary to carry out work. Give the present day cost of various items of the order. 10

Marks

2. Describe the operation of drilling for explorative boring for foundation in a tidal creek. Which machine will you prefer ? What average daily footage in rock in the creek will you consider as good work ? 9

3. Give the main classification of Boring Machines. State where each can best be used ? What machine you will prefer for boring 1,000 ft. deep bore in alluvial soil ? 9

4. Bores in Ahmedabad at 500 ft. depth fail after few days pumping. Give cause for this failure and how will you clean the failed bore. State steps you will take to prevent this failure in future work. 9

5. Write Short notes on—

   (*i*) Sinking bore in a well.

   (*ii*) Steps you will take, if big boulders are met with in boring operation, to proceed with the work.

   (*iii*) Steps you should take when rushing sand is met with during a boring operation.

   (*iv*) Water swivel.

6. Give an estimate for sinking a 6" diameter 250 feet deep bore for following strata for water supply with present day rates of labour and material.

   Black Soil 25 feet.
   Loose white soil 130 feet.
   Murum 40 feet.
   Soft and hard rock 50 feet.
   Water bearing sand. 5 feet.

   Add to your actual cost 6¼ per cent for supervision and 2 percent of the cost of machinery as hire charges for the whole operation. 10

7. What are the various methods of pumping out water from a 400 feet deep bore, static water level being 60 feet below ground. Work out the actual cost of pumping for 8 hours with one of your methods assuming a discharge of 15,000 gallons per hour to be pumped in a tank with F. S. L. 8 feet above ground.

8. Write Short notes on—
   (*i*) Fishing tool.
   (*ii*) Diamond cutter.
   (*iii*) Bhulabhai Pattern and boring machine.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS. B. S. E., CLASS II.

CENTRAL CIRCLE.

BORING (Oral)

30th June 1950.

1. State suitable materials for—
   (*i*) Diamond bit, (*ii*) V Block for marking, (*iii*) Boring casing pipe, (*iv*) Diamond cutter.

2. Explain the use of—
   (*i*) Sand pump, (*ii*) Boiler, (*iii*) Under Reamber.

3. What are (*i*) Bed plate, (*ii*) face plate, (*iii*) Angle plate (*iv*) Indicating gauge.

4. What are the cause of following defects ?

   (*i*) Engine bearing getting hot.

   (*ii*) Shot bit revolves during boring operation but does not show further drilling.

   (*iii*) Saline water being met with during boring operation.

5. Give following constituents of bore water from a 500 ft. deep bore in North Gujarat ; water is used for drinking purposes.
   (*i*) Free and saline ammonia.
   (*ii*) Nitrates.
   (*iii*) Total solids.
   (*iv*) Total Hardness.

6. What are present day prices of—

   (*i*) 6″ diar : boring casing pipe.

   (*ii*) Steam coal.

   (*iii*) Couplings for drill rods.

7. For an explorative bore for a high dam, how much deep you will go in hard rock and why ? What size of core you will prefer for such work.

8. What do you understand by testing the bore for leakage test for foundation boring ? How will you do this ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE.

GENERAL ENGINEERING CONNECTED WITH USE OF MACHINERY. (Written).

26th June 1950.

(Time : 11-00 A.M. to 2-00 P.M.)

Marks

1. Compare steam road roller and oil road rollers stating advantages and disadvantages of each. State giving reasons what type of these two you will recommend for use in rural areas ? Give average life of these rollers with normal use. What is the present day cost of 10 Ton Oil Roller ? 9

2. Work out in detail the hire charges per day to be recovered from a contractor for the use of 15 Ton Steam Road Roller with present day rate of labour and material ? You should add to your calculated rate 6¼% for idle running charge and also add for depreciation at the rate of 10% per annum on the cost of the roller ? 10

3. Write short notes on (*i*) Gas welding, (*ii*) Electric welding, (*iii*) Thermit welding. 9

4. Sketch and explain 3 types of leather belt fixtures and explain briefly which method you would prefer in a particular case. 9

5. What is the difference between a Turet and a Capstan Lathe? Give an example of a job best done on each of these lathes. 9

6. Draw a section of modern type screened sewage centrifugal pump with bottom suction and side delivery, capable of pumping 5,00,000 gallons of sewage per hour against a head of 150 ft. from all causes. Draw a suitable characteristic curve for the pump. 11

7. Compare and contrast the use of riveting and welding for a 4,000 gallons water tank. Give the advantage and limits of each method ? 9

8. How are the large size C. I. Pipes manufactured in a big factory ? How are their walls tested for thickness ? To what pressure you will test a ' C ' Class pipe and by what method ? 9

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE.

GENERAL ENGINEERING CONNECTED WITH USE OF MACHINERY (Oral).

27th June 1950.

1. What are the present day wages of Senior Carpenter, turner, welder, workshop Manager, and Boring Operator.
2. Which type of coke you will prefer for a foundry ? Why ?
3. How much good quality coal is required to generate 1 W. H. P. hour ? What is the Calorific value of coal, crude oil and sludge gas ?
4. How many Cubic feet of coke comes in a cart load ? How many 9" dia. 12 ft. long pipes will go in a cart load assuming good road.
5. What is a hydraulic gradient ? How do you measure this for a rising main and a gravity main.
6. Name the different types of Saws and what job is best done on each.
7. What do you understand by Heavy diesel, High speed and light diesel oil. Where they are best used ? What are their prices per ton.
8. What precautions you will take while puring molten metal in a mould and why ? What is good temperature of metal while pouring ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE.

USE OF MACHINERY (Written).

26th June 1950.

(Time : 3 P.M. to 6 P.M.)

[*Note.*— 8 Questions to be answered.]

1. A small repair workshop is to be installed for P. W. D. repairs at Belgaum. A five ton cupola is considered essential. For machine shop is it proposed to provide 4 Nos. of

lathes along with all other necessary machinery. Prepare an estimate for providing various types of machines for such a small repair workshop. Estimate should also include purchase of all essential tools and plant. All building shed are ready and your estimate should only include cost of purchase and supply and erection of machinery in the sheds. Electric current A. C. 3 phase 440 is available and all machines are to be run by electricity ? 10

2. A foundry having a 3 ton cupola produces annually 300 tons of good castings. Give the quantity of various raw material required during the year. Pig and scrap iron are to be used in proportion of 1 : 1. Work out the cost of production of 300 tons of casting at the present day rates of labour and material. (Exclude all cost of supervision, interest and depreciation). 9

3. At a water works electric pumping plant is installed capable of pumping 1,20,000 gallons per hour against a head of 220 ft. Plant runs daily for 8 hours. Work out the cost of running the plant for one month assuming cost of current at 0.75 annas per unit, the cost should include the cost of staff required only for running the plant. State the cost of pumping 1,000 gallons ? 9

4. Give a short specification for laying and jointing 12" diameter C. I. pipes. Give the quantity of lead required for jointing 240 feet length of these pipe lines each pipe being 12 ft. long. 9

5. You are sent for inspecting and carrying out test for newly installed oil engine driven centrifugal pumping set; what observations you will make and what test you will carry out before taking over the plant.
Driving unit is 3,000 B. H. P. six cylinder vertical engine driving the pump through gears. What oil consumption you will accept are very good ? 10

6. Write short notes on any 3 of the following :—
(*i*) Universal milling machine.
(*ii*) Venturi meter.
(*iii*) Pressure relief valve.
(*iv*) Micrometer gauge.
(*v*) Sludge gas. 9

7. River Savitri after being bunded can provide a constant minimum discharge of 3,000 cusecs. If a power station is built in the valley below a head of 1,200 ft. is available from fore bay to turbines. What size and Nos. of generating sets you will instal for this discharge and head ? Give your calculation. 10

Marks.

8. Sketch out a dimensioned lay out plan for installing 3 Nos. of direct coupled centrifugal pump and electric motor on a common base plate 6′ × 4′ in size to be housed in a pump house of 30′ × 18′ clear size built over a pure water pump of same size. Show all your delivery connections up to the rising main which is 18″ diameter in size ? 9

9. An eighty feet high earthern dam is to be constructed in Belgaum.

Total quantity of earth work is as under :—

Excavation for core wall—2 million cft.

Excavation for waste weir—1 million cft.

Excavation for tail channel—14 million cft.

Excavation for other items—0.5 million cft.

Embankment earth work 25 million Cft. 75 per cent of the excavated material is suitable for embankment while the balance can be obtained from borrow pits within one mile lead. It is proposed to construct dam with the use of machinery and complete the dam in two years. Work out the list of machinery you will recommend for the purpose and prepare an estimate for it. Give your calculations ? 10

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B. S. E., CLASS II.

CENTRAL CIRCLE, POONA.

USE OF MACHINERY. (Oral.)

Friday, 30th June 1950.

(Time : 11-00 A. M. onwards.)

1. State suitable material for the following :
   (*i*) A gudgen pin for a motor car.
   (*ii*) V-Block for marking.
   (*iii*) Main line shafting for workshop.
   (*iv*) Boring casing pipe.

2. Explain the following terms :—
   (*i*) Tolerance.
   (*ii*) Clearance.
   (*iii*) Allowance.

3. What are :—
   (*i*) Bed Plate.
   (*ii*) Face plate.
   (*iii*) Angle plate.
   (*iv*) Indicating guage.

4. What causes slip of belts in power transmission ? How much would you tolerate ?

5. What do you understand by :—
   (*i*) Soft soldering.
   (*ii*) Silver soldering.
   (*iii*) Brazing.

6. What are the causes of following defects :—
   (*i*) Knocking sound in a motor car.
   (*ii*) Work shop main shaft running accentric.
   (*iii*) Lathe belt runs well when idle but slips as soon as cut is taken.
   (*iv*) Engine bearing runs very hot.

7. What implements are seen in good black-smith's shop?

8. Where do you use ' V ' belt and where flat belt ? Is ' V ' belt good for water work, pumping set, driven by oil engines.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS OF THE B.S.E. (CLASS II).

CENTRAL CIRCLE, POONA 1.

Subject.—ACCOUNTS AND RULES OF THE PUBLIC WORKS DEPARTMENT. (Written.)

Tuesday, 27th June 1950.

Marks

(Time : 11-00 A. M. to 2-00 P. M.)

1. (*a*) What do you mean by a survey report ?
   (*b*) Write such a survey report for the following articles with reasons and remarks :—
   18 Hammers ; Cost Rs. 1-4-0 each ; purchased 8 years ago.
   25 buckets ; cost Rs. 1-12-0 each ; purchased 4 years ago.
   1 Easy Chair ; cost Rs. 60 ; purchased 10 years ago.
   1 Cup and saucer ; cost Rs. 1-8-0 ; purchased one year ago.

Marks.

2. Describe the procedure to be followed in the case of :—

   (*a*) A P. W. D. cheque, lost by a contractor.

   (*b*) A receipt for deposit lost by the depositor.

   (*c*) A time barred P. W. D. cheque. 6

3. Explain the following :—
   (1) What is the currency of a P. W. D. cheque ?
   (2) What is the minimum amount below which a P. W. D. cheque cannot be drawn ?
   (3) Administrative approval.
   (4) A Transfer Entry Order.
   (5) Recoupment of Imprest.
   (6) Earnest Money.
   (7) Workslip.
   (8) A major work.
   (9) A Sub-Head.
   (10) A Hand receipt. 10

4. (*a*) What are the different forms of contract and when is each of them used ?

   (*b*) What is the procedure to be followed when a tender, other than the lowest is to be accepted ? 8

5. Give a complete list of documents, required to be submitted by a sub-divisional Officer along with his monthly accounts. 9

6. (*a*) You anticipate an excess over an estimate at the very commencement of the work. What action will you take ?

   (*b*) What action will you take when you anticipate a large saving on a sanctioned estimate ? 8

7. Write a sample page of the sub-Divisional cash book, making the following entries :—
   (*i*) Payment of a muster roll.
   (*ii*) Receipt of cash for the chest.
   (*iii*) Payment of a first and final bill of Rs. 1,002-8-0.
   (*iv*) Advance of imprest to an overseer Rs. 75.
   (*v*) Cost of a Babul Tree sold by auction, which is sanctioned for Rs. 10.
   (*vi*) Refund of deposit of Rs. 5. 9

8. A canal has breached and you are required to repair the damage immediately. State what actions you will take from accounts point of view ? 6

Marks.

9. What are the following ?
   (*i*) A rate list.
   (*ii*) Vouchers.
   (*iii*) Extra Item.
   (*iv*) Original Work.
   (*v*) Per contra recovery. 10

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS OF THE B.E.S., CLASS II.

CENTRAL CIRCLE.

Subject.—ACCOUNTS AND RULES OF THE P.W.D. (Oral) (Batch I).

Friday, 30th June 1950.

(Time : 2-30 P.M. to 6 P.M.)

1. An Imprest holder recieves money on behalf of Government. How is it dealt with ?

2. How will you control the expenditure on a work ?

   What action will you take if you expect an excess on :—

   (*a*) Any particular item of work and

   (*b*) On the whole estimated cost of the work.

3. How will you account for the following amounts :—
   (1) Amount received from the Treasury for payment of :—
      (*a*) Muster rolls.
      (*b*) Salary of work charged establishment.
      (*c*) Salary of Temporary and Permanent Establishments.
      (*d*) Travelling allowance of Temporary Establishment.

4. Your subordinate has no Imprest Account ; but you want him to pay a muster roll. What will you do ?

5. Define :—
   (1) Last Pay Certificate.
   (2) Certificate of Payment.
   (3) Salary slip.
   (4) Completion Certificate.
   (5) Local Fund Cess.

6. What action will you take in the following cases :—
   (*a*) Additional tools found in your store.
   (*b*) Surplus cash found in your chest.
   (*c*) No progress done by a Contractor on a work, given out on A-2 form.

7. What is a Register of Tools and Plant ?
   In what forms is it maintained ?

8. What is a Stock Account ?
   What do you mean by materials charged to works ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, OF THE B. S. E. (CLASS II).

CENTRAL CIRCLE.

Subject :—ACCOUNTS AND RULES OF THE P.W.D. (ORAL) (2ND BATCH).

Saturday, 1st July 1950.

(Time : 12 NOON to 3 P. M.)

1. State the main Principal Rules for writing a Measurement Book.

2. How will you account for the following amounts :—
   (*a*) Amount received from an Imprest holder.
   (*b*) Amount received from the public for a deposit contribution work.
   (*c*) Amount received from a member of temporary establishment in payment of a fine imposed on him.

3. What action will you take in the following cases :—
   (*a*) Tools found short at the time of checking.
   (*b*) Cash found short in your chest.
   (*c*) Library books found short.

4. How will you deal with the following amounts :—
   (*a*) Undisbursed pay of a permanent Government servant.
   (*b*) Undisbursed pay of work charged establishment.

5. What do you mean by Destruction of Official Records ?

6. What do you mean by " Aid to Contractors " ?

7. What are " Contract documents " ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS OF THE B.S.E. (CLASS II.)

CENTRAL CIRCLE, POONA.

PRACTICAL TEST (ROADS AND BUILDINGS).

Monday, 3rd July 1950.

(Time : 8 A. M. to 12 NOON)

		Marks.
1.	Set up the level given to you and check whether it is in proper adjustment.	10
2.	Set up the theodolite and measure the horizontal angle subtended by the two extreme corners of the building in front of you.	15
3.	Two roads cross each other not at any angle but a right angle. Line out the fanning of the corners. The minimum radius is specified.	25

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B.S.E. (CLASS II)

CENTRAL CIRCLE, POONA.

PRACTICAL TEST (ROADS AND BUILDINGS).

Monday, the 3rd July 1950.

(Time : 3 P. M. to 6 P. M.)

		Marks.
1.	With the given level find out the *correct* difference of levels of two specified *points*.	10
2.	Set up the theodolite and explain how you will take readings for measuring a horizontal angle.	15
3.	With the theodolite set out a curve of 5 degree for a length of 500 feet.	25

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, B.S.E. (CLASS II)

CENTRAL CIRCLE, POONA.

PRACTICAL TEST (Irrigation, Land Drainage, Sanitary Engineering.)

Monday, 3rd July 1950.

(Time : 3 P. M. to 6 P. M.)

Marks.

1. Check the permanent adjustments of the level given to you and find the difference of levels of two specified points. 10

2. Measure the horizontal angle subtended at you by the two extreme corners of the buildings in front of you.

3. Set out the excavation lines of a curved flank wing wall retaining earth.
   Different slopes of earth and batters for wall are given to each candidate (for Irrigation and Land Drainage). 25

   Set out the excavation lines of the footings of R. C. C. columns of a water tower.
   There are 8 columns symetrically situated. The distance of footings C to C. is 10 feet. The footings are square 2′ 6″ × 2′ 6″ (for Sanitary Engineering). 25

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I.

GUJARAT CIRCLE, BARODA.

GENERAL ENGINEERING CONNECTED WITH IRRIGATION, ROADS AND BUILDINGS (Written).

Monday, 10th July 1950.

(Time : 2-00 P.M. to 5-00 P.M.)

(Attempt any *eight* questions. All questions carry equal Marks. 3 marks reserved for neatness and sketches).

(Total Marks 75.)

1. (*a*) Distinguish between—
   (*i*) Ordinary Portland Cement.
   (*ii*) Rapid Hardening Cement and
   (*iii*) Quick setting Cement.
   Can rapid hardening Cement be quick-setting ?

(*b*) A Contractor entrusted with the work of R. C. C. beam and slab construction proposes to use a richer mix than specified without changing the type of cement to be used, with a view to striking the centering earlier than normally required for the specified mix. Can this be permitted ? Give reasons for your answer.

2. Give specifications for any four of the following :—

(*i*) Earthwork for an embankment.

(*ii*) Aggregates for cement concrete.

(*iii*) R. C. C. curb for a well.

(*iv*) Supply of road metal.

(*v*) White-washing 3 coats.

3. Mention some of the principle types of modern earth excavating machinery. Which of these you will normally specify for—

(*a*) Road Project.

(*b*) An Irrigation Project ?

4. Mention in brief the principle considerations to be taken into account in deciding the types and depths of foundations for a road bridge?

5. You are desired to report on the causes of cracks in an existing building and suggest remedial measures. How would you proceed ? If on investigations you find that the craks were due to founding on black cotton soil, what measures you would suggest to be adopted ?

6. Sketch a brick masonry retaining well (with dimensions) to retain a 20 ft. depth of cut in a rather clayey soil. Explain the functions of various parts.

7. What type of culvert you would recommend for a site where good soil for foundations is not met with even at a depth of 15 ft.? Sketch a design for such a culvert with approximate dimensions for various parts to drain a moderately sloping catchment of the one sq. mile. Average rainfall 30".

8. What precautions you would take at the time of construction to avoid leaks in flat R. C. C. terraced roofs ? If such a roof is found leaking, what methods you would suggest to prevent such leaks ?

9. In an area infested with white ants, what precautions you would advise to be taken during the construction of a record building ? What suggestions you would offer if the wood work of an existing building is already under the attack of white ants ?

10. While specifying the rates for the items of excavation for a canal for depths varying from 5 ft. to 25 ft., which of the following methods you would prefer to adopt and why ?

(*i*) A flat rate for all depths varying from 5 ft. to 25 ft.

(*ii*) Different rates for (*a*) 0 to 5 ft. depth, (*b*) 0 to 10 ft. depth, (*c*) 0 to 15 ft. depth and so on.

(*iii*) Different rates for (*a*) 0 to 5 ft. depth, (*b*) 5 ft. to 10 ft., (*c*) 10 ft. to 15 ft., (*d*) 15 ft. to 20 ft. and so on.

Give reasonable rates for this item either for (*i*), (*ii*) or (*iii*) above as may be finally decided to be adopted by you.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I.

GUJARAT CIRCLE—BARODA.

ACCOUNTS AND THE RULES OF THE P.W.D.
(Written)

Tuesday, 11th July 1950.

(Time: 10-30 A.M. to 1-30 P.M.)

(Marks 75)

Marks.

1. What are the contract documents and what do they include ? State different types of contract forms in use in P. W. D. 10

2. (*a*) What action would you take when a contractor defaults against contract B-2 ?

(*b*) What is solvency certificate and why is it necessary ? Who issues the same ? Can it be a guarantee against default by contractor ?

(*c*) Certain materials are taken on Road Metal Return while some materials are on material at site account or on surplus store account. How do you distinguish between these ? How do you account for them before use and when used ? 10

3. What are the cannons of financial propriety ? What steps would you take to guard the same ? 6

Marks.

4. What do you understand by—(answer any three)
   (*i*) Temporary and permanent imprest.
   (*ii*) Famine tools and their accounting for.
   (*iii*) Remittance Transfer Receipt and letter of Credit.
   (*iv*) Modified Estimate, Supplementary Estimate, and Revised Estimate ? 6

5. What are the rules in connection with the construction of the residential buildings ? What documents are to accompany the estimates and why ?

   On what are C. R. and S. R. of buildings based ? Who controls these funds ? What types of repairs are included in either ? What is the limit of allotment ? 6

6. Explain any six of the following :—
   (*i*) Write back order (*ii*) Last Pay Certificate (*iii*) Register of works and Sub-heads (*iv*) Works abstracts (*v*) Work-slip (*vi*) Completion report (*vii*) Cash (*viii*) Unserviceable stores and their disposal. 6

7. (*a*) How is money received by the following accounted for ?

   (*i*) Overseer (*ii*) Imprest-holder (*iii*) S. D. O. (*iv*) Divl. Head clerk (*v*) Divl. Overseer.

   (*b*) What do you understand by—
   (*i*) Contract work (*ii*) Piece-work (*iii*) Task work (*iv*) Gang-work. How does each come in during your work ? 8

8. Give the rules for keeping measuremert books. Why is measurement book considered as of prime importance for accounts ? 8

9. (*a*) How do you make payment to a contractor in another District ?

   (*b*) Why and when is a stamped receipt necessary ? What denomination and type of stamps are necessary for various amounts ? 9

10. What are the present powers of Executive Engineer for—
   (*i*) Sanctioning tenders.
   (*ii*) Appointing Work-charged establishment.
   (*iii*) Technical sanctions for residential and non-residential buildings.
   (*iv*) Writing off buildings from printed returns.
   (*v*) Writing off tools and plant.
   (*vi*) Hire of a store. 6

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I.

GUJARAT CIRCLE—BARODA.

IRRIGATION & IRRIGATION ACT.

(Written)
Tuesday, 11th July 1950.

(Time : 2-30 P.M. to 5-30 P.M.)

(Marks 75)

(All questions carry equal marks.)

[Only *eight* questions to be attempted. (3 marks reserved for general neatness and sketches.)]

1. What precautions you take for foundations for canal structures such as regulators, falls etc. in alluvial soils ? What are general principles for design ? Illustrate by sketches.

2. Describe any four of the following :—
   (1) Kings vanes.
   (2) Standing wave flume.
   (3) Hydro Isobars.
   (4) 'X' limit.
   (5) Level crossing on canal.
   (6) Pick-up-weir.

3. What is soil analysis—give specifications with reference to soil mechanics for construction of an earthen dam.

4. Describe powers to stop water supply to any water course ?

5. What are the advantages of drainage in a canal zone ? How is good drainage affected ? What are the relative advantages of pipe drains over open trenches ?

6. (*a*) Describe duties of a canal officer.

   (*b*) What action has to be taken for settlement of dispute in case of water-course ?

7. What are rights and obligations of owners of water-course ?

8. Design a culvert over a Nala with 2 sq. miles of flat catchment. Assume suitable dimensions of Nala. Channel carries 100 cusecs with 20 ft. wide and 4 ft. depth.

9. Give detailed notes for investigation of a project of a storage reservoir for irrigation. What data is required to be collected ?

10. How would you proceed to check unauthorised irrigation and what points you will notice on site ? Give some instances of unauthorised irrigation generally practised.

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I.

GUJARAT CIRCLE—BARODA.

GENERAL ENGINEERING (Oral).

Wednesday, 12th July 1950.

(Time : 2 P.M. to 4 P.M.)

Marks.

1. How will you estimate the approximate cost of an Irrigation Project ? 6

2. Explain the terms—
   (*i*) Area under command.
   (*ii*) Culturable area.
   (*iii*) Hydraulic Gradient.
   (*iv*) Loam.
   (*v*) Low heat cement. 10

3. (*i*) What is a day cusec ?
   (*ii*) What is its equivalent in acre-feet ?
   (*iii*) What acreage of rice one million Cu. ft. of water can normally irrigate ? 6

4. (*a*) What run off you would normally assume in million Cft. per sq. mile of catchment in designing the capacity of Irrigation Tanks in Kaira and Panch Mahals Districts ? 6 3
   (*b*) What is hydrograph ? How is it useful ? 3

5. (*a*) What stresses you will allow for cement concrete 1 : 2 : 4 for—
   (*i*) Compression in beading
   (*ii*) Direct compression.
   (*iii*) Shear.
   (*iv*) Bond ? 8 4
   (*b*) What minimum cubestrength you would expect for the above concrete ? 2
   (*c*) What is modular ratio ? Does it vary with age of concrete ? 2

Marks.

6. (*a*) What is water-cement ratio ? 2 **9**

(*b*) For the same workability, which of the two—(i) gravel cement concrete, (ii) broken metal cement concrete will give a higher water-cement ratio ? For the same cement proportion, which will give high strength for the same workability ? 4

(*c*) What slump you will permit for—

(i) Mass concrete 1 : 2 : 4.

(ii) T. beams.

(iii) Concrete in road slabs ? 3

7. (*a*) How would you measure the following :— **12**

(i) Road metal.

(ii) Mangalore Tiled roof, would you take into account the projection of tiles beyond the caves board ?

(iii) $4\frac{1}{4}$" thick brick partition.

(iv) R. C. C. decking slab for a bridge ? 8

(*b*) How would you proceed if dead men or copss palles were either not kept or removed before earth work was measured ? 4

8. (*a*) What will be the cubage on plinth area basis of— **10**

(i) A temporary store shed.

(ii) A temporary S. D. O.'s quarters.

(iii) A permanent Inspection Bungalow ? 6

(*b*) Mention the prevailing rates for—

(i) G. C. I. Sheet roof.

(ii) Brick in Lime masonry for ground floor.

(iii) R. C. C. slab and walls for an overhead tank 30 ft. high above G. L.

(iv) Hard rock cutting. 4

9. (*a*) During monsoon in a hilly tract covered with jungle, you are confronted with a slab drain, slabs of which have collapsed. You are to go across for urgent inspection. What temporary expedient you will devise in the circumstances ? **8** 4

(*b*) What area a 2 ft. dia. hume pipe can normally drain ? 2

(*c*) Why are deep holes kept in the retaining walls and abutments of bridges ? What will happen if these are omitted altogether ? 2

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I.

GUJARAT CIRCLE—BARODA.

ACCOUNTS AND THE RULES OF P. W. D. (Oral).

Wednesday, 12th July 1950.

(Marks 75.)

		Marks.	
1.	(*a*) What are advance payment, secured advance and aid to contractors ? When is each admissible and how will you guard the interests of Government in each ?	6	10
	(*b*) When are duplicate and triplicate receipts issued ? In the case of latter types, what further action is taken ?	4	
2.	(*a*) In what way is Schedule B prepared in case of lump sum contract ? What form is used for such contract ?	5	10
	(*b*) How are issue rates fixed and at what rates do you issue materials to contractors for works when and where not included in Schedule A ?	5	
3.	(*a*) On what fund head do you purchase furniture in District Bungalows ? Who controls those funds ?	3	9
	(*b*) What are the usual items of Revenue Receipts in a Sub-division and how do you control them ?	3	
	(*c*) What are record drawings and why and when are they prepared ?	3	
4.	(*a*) What happens if a contractor refuses to sign a final bill ?	2	5
	(*b*) Can quantities of items of works in a contract be changed and if so, how is the contractor affected ?	3	
5.	(*a*) What items pass through purchase account ?	3	12
	(*b*) How will you keep a check on issue of controlled materials ?	3	
	(*c*) In heavy flood a severe damage occurs to road in your charge. What immediate action will you take ?	3	
	(*d*) How are urgent works started in anticipation of allotment ?	3	
6.	(*a*) When can tools be lent to contractors and pieceworkers and ratelist holders ? How do you safeguard the tools ?	6	12
	(*b*) What are the powers of Executive Engineer in—	6	
	(i) Sanctioning small deviations from sanctioned plans.		
	(ii) Accepting tenders when tenders are within estimated amount.		
	(iii) Excess over estimates.		

Marks.

7. (*a*) What are pass books, order books, departmental note books and measurement books ? 4 11
   (*b*) What will you do when a voucher is lost, measurement book is lost, muster roll is lost before closing, and cheque is lost ? 4
   (*c*) What is a requisition ? Up to what limit can you make purchases on the same ? 3

8. (*a*) What precaution will you take to avoid rush of expenditure ? 3 6
   (*b*) How do you check up parts II and III of muster roll ? Can you pay muster roll through Overseers ? 3

PROFESSIONAL EXAMINATION OF ASSISTANT ENGINEERS, CLASS I.

GUJARAT CIRCLE—BARODA.

IRRIGATION AND IRRIGATION ACT (Oral).

Wednesday, 12th July 1950.

Marks.

1. What is— 15
   (1) Berm.
   (2) Adsali.
   (3) Groyne.
   (4) Panchnama.
   (5) Duty ?

2. What are the depth of Irrigation in inches for the following crops :— 10
   (*a*) Sugar-cane.
   (*b*) Fruit garden.
   (*c*) Rice.
   (*d*) Khapli (wheat).
   (*e*) Onions?

3. What action is taken when water is wasted ? What are the penalties as per Canal Rules? 10

4. How would you guage a river and how would you estimate its maximum discharge ? 15

5. What do you consider as a good maintenance of a canal ? Give points which should be looked into carefully. 13

6. What do you mean under Irrigation Act by anyone endangering stability of canal, etc.? 12

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT CIRCLE—BARODA.

GENERAL ENGINEERING CONNECTED WITH IRRIGATION, ROADS AND BUILDINGS (Written).

Monday, 10th July 1950.

(Time : 2 P. M. to 5 P. M.)

Attempt any *eight* questions. All questions carry equal marks. Three marks reserved for neatness and sketches.

(Total marks 75.)

1. From the particulars given below, state giving reasons whether brick masonry or rubble masonry (both in cement mortar 1 : 6) will be economical. Rubble and sand are available at a distance of 2 and 3 miles respectively from site. Bricks are available at Rs. 30 per 1,000 Nos. but the lead is 8 miles. Cement costs Rs. 90 per ton on site.

2. What precautions you would take while blasting rock with dynamite?

3. Design R. C. C. T. beam for the first floor of an office-room 14′×18′ (one central beam to span 14 ft.) Slab thickness 6″ excluding floor tiles.

4. Give specifications for any four of the following :—
   (i) Aggregates for cement concrete.
   (ii) Earthwork for road embankment.
   (iii) Hard rock cutting.
   (iv) Lime mortar for brick masonry.
   (v) White-washing.

5. How is lime burnt in your Division? Give details of such a kiln with sketch. Give proportions of various materials used and the out-turn expected. Work out also the analysis of cost on the basis of the above operations.

6. You are prospecting for suitable lime quarries. How would you proceed ? In case you get only fat lime, how would you render it hydraulic ? For what purposes can fat lime be used safely ?

7. Give detailed instructions for road maintenance to your karkoon in connection with (*a*) pre-monsoon repairs, (*b*) re-surfacing during monsoon, (*c*) post-monsoon repairs. Give full details of labour and tools for 12 miles of road out of which 2 miles are to be re-surfaced.

8. Draw neat sketches for use on works for three of the following :—
   (*a*) Tounged grooved joinery ; mortise and tennon joint.
   (*b*) English Bond at a corner of an 18″ wall.
   (*c*) Joinery for a king post Truss 12 ft. span at king post joining with tiebean giving dimensions at joints.
   (*d*) Pennel door.

9. Draw ideal sections for a road 24 ft. formation width, 12 ft. metal 4½″ thick in—
   (*a*) Bank 18″.
   (*b*) Cutting 2 ft.
   (*c*) Black cotton soil.
   Rainfall is 30 inches.

10. What precautions you would take at the time of construction to avoid leaks in flat R. C. C. terraced roofs ? If such a roof is found leaking, what methods you would suggest to prevent such leaks in future ?

11. Mention in brief the principal considerations to be taken into account in deciding the types and depths of foundations for a road bridge ?

12. Sketch a retaining wall (with dimensions) to retain a 20 ft. depth of cut in rather a clayey soil. Explain the functions of various parts.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT SIRCLE—BARODA.

GENERAL ENGINEERING CONNECTED WITH SANITARY ENGINEERING, WATER SUPPLY, BORING AND USE OF MACHINERY (Written.)

Monday, 10th July 1950.

(Time : 2-00 P.M. to 5-00 P.M.)

[Attempt any *eight* questions. All questions carry equal marks. Three marks reserved for neatness and sketches.]

(Total marks 75.)

1. Compare costs of service roads 12 ft. wide at Kaira or Surat for the following types of road :—
   (*a*) 6″ Stone soling and 4½″ Stone metal with Murum blinding.
   (*b*) Brick-on-edge soling with hard crust of cement concrete 1 : 2 : 4 4½″ thick.

2. What type of pumps would you prefer for dewatering a Jack well during sinking operations to a depth of 50 ft. ? State the reasons of your choice.

OR

What type of pumps would you select for dewatering 6″ dia. tube-well 250 ft. deep ? Water-level 25 ft. below G. L.

3. What do you understand by a damp-proof course in a building and where it is used ? What materials are used in its construction ?

4. What do you understand by vertically spun and horizontally cast Cast Iron pipes ? What are test pressures adopted for class B and C pipes ? How much lead is required for a S & S joint or 18″ C. I. Pipe.

OR

What types of pipes are used for casing bores ? Draw a dimensioned sketch for a coupling on 6″ dia. casing pipes.

OR

Draw a sketch showing arrangement for extension of a transmission shafting. What metals are used for bearings on the shaft ?

5. Draw a sketch showing cooling water arrangement for 250 H. P. Diesel oil Engine in relation with the Engine house. Also show the arrangement for exhaust system.

OR

A boring plant of calyx type is to work on a 40 ft. high bank of a river. Draw a sketch showing the arrangements for Water Supply for the boring operations. What pump would you select ? State reasons.

6. Describe the anti-Malaria measures you would adopt on the construction of a service Road passing through cultivated land and also for an Engine house on the bank of a river.

7. Design a circular type of man-hole on an 18″ sewer line 12 ft. below G. L. The top of the man-hole is supposed to carry the load of a 12 ton steam road roller. Prepare an approximate estimate of the man-hole based on the current rates in your district.

8. A high lift pumping set consisting of 15 H. P. Electric Motor directly coupled with a 4″ × 3″ centrifugal pump on a commor base plate is to be used for dewatering a well 20 ft. dia. The depth of the well is 50 ft. and the water level is 32 ft. below the top. Sketch arrangements for installing the set in the well. Show the level at which you will install it.

9. Draw a dimensioned sketch for an Engine House showing the ventilation arrangements to accommodate a 100 H. P. Diesel Engine and a belt driven pump installed on a well outside the Engine House.

10. Describe how a casting of an 18" C. I. Tail piece 4 ft. in length, one end socketted and other end flanged is made. What precautions are taken to avoid air pockets in the casting? How would you finish the flanged end ?

11. Write short notes on any *three* of the following :—

(*a*) Fuel injection pumps, (*b*) Super-heated steam, (*c*) Brake horse power, (*d*) Screw jack with worm and worm wheel, (*e*) Differential pulley block.

12. Draw sketches showing details of a gantry with travelling crane arrangements capable of lifting 3 ton load for—

(*a*) A workshop having a roof supported on steel columns—width of the shop 25 ft. columns 10 ft. apart.

(*b*) An engine house having masonry walling 30 ft. span—thickness of walls 2 ft.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT CIRCLE—BARODA.

ACCOUNTS AND THE RULES OF THE P. W. D. (Written)

Tuesday, 11th July 1950.

(Time : 10-30 A.M. to 1-30 P.M.) Marks.
(Total marks 75.)

1. You are given an imprest of Rs. 200 for sundry payments. You have no drawing power. Prepare an Imprest Account presuming that you have a balance of Rs. 15-8-0 left. Complete the Imprest Account for submission to Divisional Office presuming the following payments :— 10

	Rs.	a.	p.
Payment of Muster Roll passed by the Executive Engineer.	50	0	0
Payment of unclaimed wages ...	10	0	0
Payment of railway freight	25	0	0
Payment of work-charged Estt.	99	8	0

2. What are the contract documents and what do they include ? State different types of contract documents in use in P. W. D. 10

Marks.

3. (*a*) What action would you take when a contractor defaults against contract B-2 ? 10

(*b*) What is a solvency certificate and why is it necessary ? Who issues the same ? Can it be a guarantee against default by contractor ?

(*c*) Certain materials are taken on Road Metal Return while some materials are on material at site account or surplus store account. How do you distinguish between these ? How do you account for them before use and when used ?

4. What do you understand by (answer any *three*)— 3

(*a*) Temporary and Permanent Imprest.

(*b*) Famine tools and their accounting for.

(*c*) Remittance Transfer Receipt and Letter of Credit.

(*d*) Modified Estimate, Supplementary Estimate and Revised Estimate ?

5. What Accounts documents are being submitted to Divisional Office by sub-divisional office (*a*) monthly, (*b*) six-monthly, (*c*) yearly ? How are they disposed off in the Divisional Office ? 8

6. Explain any *six* of the following :— 6

(i) Write back order, (ii) Last Pay Certificate, (iii) Register of works and Sub-heads, (iv) Works abstracts (v) work-slip, (vi) Completion Report, (vii) Cash, (viii) Unserviceable stores and their disposal.

7. (*a*) What stores Tools and Plant returns do you submit to Divisional Office ? 9

(*b*) When cash is required for Sub-division, in how many ways is it obtained and accounted for ?

8. Give the rules for keeping measurement books. Why is measurement book considered as of prime importance for accounts ? 10

9. What are the present powers of Executive Engineer for (i) Sanctioning tenders, (ii) Appointing work-charged Establishment, (iii) Technical sanction for residential and non-residential buildings, (iv) Writing off buildings from printed return, (v) Writing off Tools and Plant, (vi) Hire of Store ? 6

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT CIRCLE—BARODA.

ROADS AND BUILDINGS.

(With special reference to modern type of Road construction).
(Written).

Tuesday, 11th July 1950.

(Time : 2-30 P. M. to 5-30 P. M.)

(Total Marks 75.)

Neatness and sketches carry 3 marks. All questions carry equal marks.

1. You have to do one mile of 1" of asphalt 15' wide treatment on an existing water bound macadam road 15' wide. Which treatment would you prefer and why ? Give full details of the treatment with quantity of materials required, labour gangs and tools you have to arrange for.

2. Give details of two cheap types of houses (life 10 years atleast) ? What are the approx. plinth area rates ? How would you modify them for use as village school building ?

3. What do you understand by :—
   (*i*) Framed structure.
   (*ii*) Katcha pucca structure.
   (*iii*) Hollow concrete block construction.
   (*iv*) Plinth area and carpet area with present day cost for different types.
   (*v*) Copings and cornices.
   (*vi*) Shoring, shuttering and centres.

4. Give in broad outlines how you would execute 20' wide cement concrete road on an existing water bound road 15' wide mentioning proportion and thickness. What type of construction will you use if the road has very heavy traffic ? Give details of operation showing location of plants, materials per mile, labour, and tools required.

5. (*a*) How will you carry out repairs to asphalted surface in wet weather ?
   (*b*) How would you test lightening conductor on buildings with modern apparatus like 'megger

6. Where would you prefer conphalt road ? What are different types of joints with comperative characteristics of each ?

OR

On economics of road pavement-looking to the nationalisation of road transport which type of surface would you prefer and why ? What is your experience of different types of roads in Gujarat and which has stood well economically ?

7. Work out in details, analysis of rates for rolling by 3 ton bullock roller. For what types of works is it used ?

8. Write down specifications for an approach road with kanker wearing surface.

OR

You have to do an urgent work of 4 storeyed R. C. C. framed structure. Give a cross-section (imaginary) with details. State your organisational arrangements and state what can will you excercise, presuming building materials are on site ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS-II.

GUJARAT CIRCLE—BARODA.

IRRIGATION AND IRRIGATION ACT.

(Written).

Tuesday, 11th July 1950.

(Time : 2-30 P. M. to 5-30 P. M.)

All questions carry equal marks.

(Total Marks 75.)

[Only eight questions to be attempted, (three marks reserved for general neatness and sketches).]

1. Define any four as per Irrigation Act.—
(1) Drainage work, (2) Owner of water course, (3) 2nd Class Irrigation work, (4) Penalties, (5) Canal officer.

2. Define any four of the following.—
(1) Acre foot, (2) Semi-module (3) Full supply coefficient (4) Murum Iso-bar (5) Coefficient of rugosity.

3. Draw a typical cross-section of a canal carrying 100 cusecs in full Bank, Partial Bank and full cutting.

4. In how many ways you measure a canal discharge and give advantage and disadvantages of each.

5. Draw a section of pick-up-weir on a Nala with rock foundatoin and show protection required on the downstream.

6. When can supply of water to any watercourse be stopped ?

7. (*a*) Describe duties of a canal officer.

   (*b*) What action is to be taken for settlement of disputes in case of water-course.

8. When can anyone be peralised for damaging a canal.

9. Give specification for earth work for Hearting in an earthen dam for tank. Give a typical cross-section of a dam.

10. How would you proceed to check unauthorised irrigation and what points you will notice on site.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

(CLASS II.)

GUJARAT CIRCLE—BARODA.

SANITARY ENGINEERING

(Written).

Tuesday, 11th July 1950.

(Time : 2-30 P.M. to 5-30 P.M.) Marks.

1. A main collecting well at the edge of a river bank is to be connected to the Jack well in the Engine House 200 ft. away under conditions as below.

   Details of strata obtained from a trial bore.

0– 8 ft. below G. L.	Black cotton soil.
8–30 ft. below G. L.	Glay and yellow soil
30–40 ft. below G. L.	Sticky clay.
40–45 ft. below G. L.	Chopan soil.
45–55 ft. below G. L.	Loose sandy soil.

Marks.

Sub-soil water level met at 42 ft. below G. L.

Proposed invert of the pipe 50 ft. below G. L.

Dia. of collecting pipe-30" Hume steel.

Describe the method of laying and jointing the Pipe showing detailed dimensioned sketch of the trench and shoring required.

What arrangements you would make for dewatering the trench ? 12

2. Write a short preliminary note giving financial forecast for a water supply scheme for a village Panchayat of 4,000 population in Kaira District. Source of supply is from an open well with an 8" bore inside. 12

3. Describe the principle sources of Water Supply in North Gujerat and sketch a layout of various works in-connection with water supply scheme for a town of 40,000 population based on five tube wells. Water is met at 5 ft. below ground level, 10

4. Describe the various methods of Sewage disposal. What method sewage treatment you would recommend for town of 1,00,000 population in Bombay State. What will be the volume of gas produced per day for the above Scheme ? 10

5. Describe the action of a septic tank with a sketch. Where would you use it and how will you dispose off the effluent ? 8

6. Describe any three of the following with sketches whereever required :—
   (*a*) Storm-water overflow,
   (*b*) Junction Man-hole,
   (*c*) Acqua Privy,
   (*d*) Water closet showing connections to main-sewer. 9

7. Explain any three of the following :—
   (*a*) B. O. D., (*b*) Ph. value, (*c*) Total hardness of water, (*d*) Dry weather flow, (*e*) Recuperation test of a well, (*f*) Water hammer. 6

8. Describe and compre slow sand and rapit gravity filters.

   Explain Aeration and sterilization and say why each of them is necessary. 8

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT CIRCLE—BARODA.

BORING ENGINEERING (Written).

Tuesday, 11th July 1950.

(Time : 2-30 P.M. to 5-30 P.M.)

Marks.

1. A 4" bore is proposed for determining the foundations of a bridge across a river, the bed of which shows an outcrop of exposed trap rock and boulders. What type of drill would you use ? Describe the operation of setting up the drill and keeping the bore in alignment. 10

2. What type of boring machine would be suitable for sinking 8" tube well in Ahmedabad for drinking water supply ? Describe the operation of sinking such a tube well with the machine you choose. At what depth potable water is likely to be met with. 10

3. What is the method of securing and preserving the samples of cores from the Bores ? What method would you employ in breaking off the core ? 8

4. Describe different types of strainers used in borings. Under what conditions you would use them ? What method you would adopt for removing the clogging trouble and increasing the yield of a relatively shallow well, in fine sand ? 8

5. A 10" tube well is sunk in Viramgaon 350 ft. below the G.L. where potable water is met with, and the well has started showing artesian conditions. Describe the method of testing the max. yield the bore is capable of giving without damaging the bore. How much yield you expect the well to give ? 9

6. While driving a six inch bore caving is noticed at a depth of 120 ft. and the tool has got jammed. How would you proceed with further sinking ? 9

7. A bore is proposed to be taken for ascertaining the foundations of a bridge across a tidal creek in Thana District. The variations of the tide are limited to five feet. How will you proceed to take the bore in mid-stream ? 10

8. Prepare a estimate for sinking a ten inch Bore in Ahmedabad to a depth of 400 ft. showing cost of labour and materials including pipes etc. Name the machine you are going to use.

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT CIRCLE—BARODA.

USE OF MACHINERY (Written).

Tuesday, 11th July 1950.

(Time : 2-30 P.M. to 5-30 P.M.)

Marks.

1. Draw a layout plan for a small workshop showing arrangements for installing various machines, for carrying out maintenance and repairs to 50 transport vehicles. 10

2. Compare road rollers run on steam and oil stating their advantages and disadvantages. Which type you would recommend for urban and rural areas ? State average cost of repairs required annually for maintenance of these rollers. 9

3. Describe the function of a carburettor in a motor car. 7

4. What is meant by welding ? Which of the common metals can be welded or forged ? What is meant by case hardening and what is the object of this process ? 8

5. What do you understand by steam vacuum pump ? What are its advantages and where it could be used. 8

6. Describe the action of a high lift deep well centrifugal pump capable of a discharge of 3 lakhs gal. of water per hour at a height of 100 ft. installed in a well 60 ft. deep. How is the lubrication carried out ? The dia. of the vertical column will be 20 inches. 9

7. What is meant by the following ? Answer any four.
   (*a*) Lagging for pipes.
   (*b*) Condensor in a motor car.
   (*c*) Gudgeon pin.
   (*d*) Injenction nozzle.
   (*e*) Pressure release valve.
   (*f*) Self starter in a motor car. 12

8. Write short notes on any *three* of the following :—
   (*a*) Sand blasting.
   (*b*) Reciprocating pumps.
   (*c*) turbine pumps.
   (*d*) Bevel gears.
   (*e*) Surface condensors.
   (*f*) Governor on an Engine. 12

9. What sort of foundations are required for installing a 200 H. P. Ruston Engine. How will you check the alignment and level of the foundation. What precautions will you take to avoid transmission of vibrations to the Engine House. 9

Note.—Any eight of the above questions to be answered

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT CIRCLE—BARODA.

PRACTICAL TEST.

Wednesday, 12th July 1950.

(Time : 9-0 A. M. to 11-15 A. M.)

Marks.

1. Set out a circular curve joining the points A and C and tangential to AB and BC by Chord and offset method. Write out the deviation angle, the radius of the curve and offsets. 15

2. Set up the theodolite and read the horizontal and vertical angles between the two specified points. 10

3. Connect the two specified points by fly levels and work out the difference in elevation between these points. 10

4. Explain handling the given level, the permanent adjustments and how you will cary them out. 8

5. Find out area of a given figure by plainimeter. 7

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT CIRCLE—BARODA.

USE OF MACHINERY BORINGS (Practical test).

Wednesday, 12th July 1950.

Note.—Questions Nos. 1 to 4 for use of Machinery.
Question Nos. 1, 3, 5 and 6 for boring.

1. Set up a lathe to reduce $1\frac{1}{2}$" M. S. Round bar by 1/16". 15

2. Prepare a riveted lap joint by cutting a $\frac{1}{2}''$ thick 3″ wide and $1\frac{1}{2}''$ long M. S. Plate. The lap will be $3\frac{1}{2}''$ width. Marks.

   3 Nos. of $\frac{3}{8}''$ width diagonally arranged. Holes should be drilled separately. 15

3. Prepare a machine surface for a 2″×2″ casting on a shaping machine. 15

4. Explain the gearing arrangement of a lathe. 5

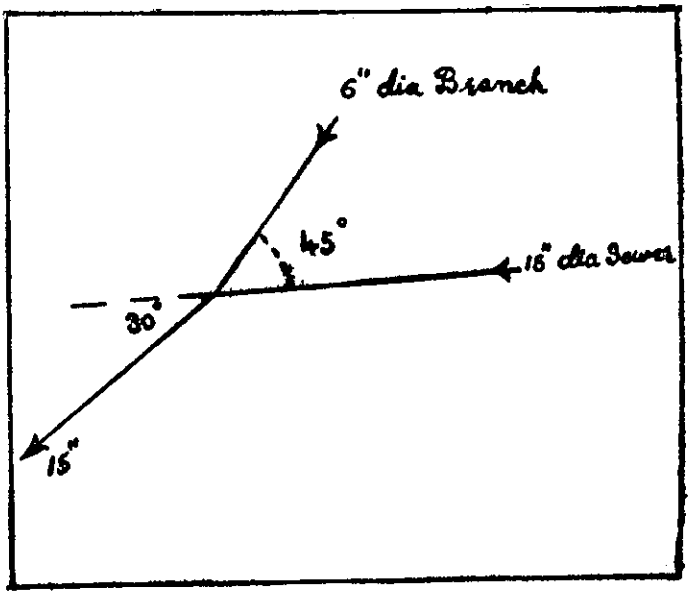
5. Explain the purpose of a shotbit to a 6″ core barrel and adjust it to the core barrel. 10

6. What is the use of Davis Cutter. Adjust a cutter to the 6″ core barrel. 10

   Note. -For 5 and 6 explain actual parts of clay drill and their adjustments.

SANITARY ENGINEERING (Practical test).

Lay out a manhole 5′×3′ over a 15″ sewer junction. One 6″ Branch also joins. 25



PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT CIRCLE—BARODA.

GENERAL ENGINEERING CONNECTED WITH IRRIGATION, ROADS AND BUILDINGS (Oral).

Thursday, 13th July 1950.

Marks.

1. Give prevailing rates for—
   (*i*) Brick in lime masonry for superstructure,
   (*ii*) R. C. C. T. Beams for buildings,
   (*iii*) C. T. Wood doors with $\frac{1}{2}$" thick panels,
   (*iv*) Earthwork for road embankment with lead 300 ft. and lift 5 ft.,
   (*v*) Hard rock cutting. 10

2. (*a*) What load a P. W. D. lorry usually carry ? 2
   (*b*) What will be the average rate of consumption of petrol for the above lorry on a fair weather road ? 2
   (*c*) Give reasonable lorry loads for—
   (1) Bricks,
   (2) $1\frac{1}{2}$" metal,
   (3) Sand. 6

3. (*a*) How will you approximately estimate the cost of a reservoir ?

   OR

   How will you approximately estimate the cost of the following categories of roads in your District—
   (*i*) M. D. R. and (*ii*) V. R.? 6
   (*b*) What do you understand by—
   (*i*) a ridge canal (*ii*) a contour canal ?

   OR

   What do you understand by—
   (*i*) An Irish Bridge, (*ii*) High level causeway ? 6

4. (*i*) What is a day cusec ?
   (*ii*) What is its equivalent in acre-feet ?
   (*iii*) What is run off ? What is the usual allowance for run off in Gujarat ?
   (*iv*) What is the thumbrule in determining the sizes for Hume pipes for drains ? 8

5. What stresses you will allow for cement concrete 1 : 2 : 4 for (*i*) compression in bending, (*ii*) direct compression, (*iii*) shear and (*iv*) bond ? 4

Marks.

6. Give reasonable outturn per artisan or labourer for—
   (*i*) Excavation in ordinary earth with lead 100 ft. and lift 5 ft.
   (*ii*) Excavation in hard rock.
   (*iii*) Breaking metal $1\frac{1}{2}''$.
   (*iv*) Brick masonry 2nd Class for ground floor. 8

7. How do you measure the following ?
   (*i*) Road metal.
   (*ii*) Mangalore tiled roof. Would you take into account the projection of tiles beyond the eaves board ?
   (*iii*) Doors and windows.
   (*iv*) Earthwork for a road embankment.
   (*v*) R. C. C. decking slab for a bridge. 10

8. (*a*) Why are bricks soaked in water before laying in masonry ?
   (*b*) Why is lime mortar ground in a mortar mill instead of being mixed like cement ?
   (*c*) Why is rebate made in door and window-frames ? Is it absolutely necessary ?
   (*d*) How will you test good lime on site ? Can you suggest a field test for testing its hydraulicity ? 8

9. During monsoon in a hilly tract covered with jungle, you are confronted with a slab drain, slabs of which have collapsed. You have to go across for urgent inspection. What temporary expedient you would devise in the circumstances ? 5

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT CIRCLE—BARODA.

GENERAL ENGINEERING CONNECTED WITH SANITARY ENGINEERING, BORING, AND USE OF MACHINERY (Oral).

Wednesday , 12th July 1950.

Any eight to be answered. All questions carry equal marks. Three marks reserved.

1. What mileage per gallon of petrol does a 30 H. P. 3 ton truck give over a katcha road ? When is lubricating oil required to be changed ? What is the life of a Heavy duty tyre for the above vehicle ?

2. What surface and cubic area will you specify for a Hospital ward ? How will you orient the operation theatre ? What is the latest method of lighting the operating table for use at night ?

3. What is meant by the following and for what purpose are they used ?
   (*a*) Rapid hardening cement. Name any two brands on market.
   (*b*) Vibrated concrete.
   (*c*) Porous pipe gallery.
   (*d*) Spillway on a dam.

4. Quote prevalent rates for any three of the following in your district.
   (*a*) Providing and laying cement concrete 1 : 2 : 4 with metal chips as aggregate.
   (*b*) Providing and laying cement concrete 1 : 2 : 4 with brick bats as aggregate.
   (*c*) Laying and jointing 18″ diameter or 24″ dia. Hume steel pipe including all jointing materials.
   (*d*) Cutting threads on an 8″ casing pipe per inch.
   (*e*) Providing a coupling for 8″ casing pipe.
   (*f*) ½″ and 1″ diameter Bolts with nuts per lb.

5. (a) What scale is laid down by Government for giving grant-in-aid to Local Bodies for water supply and Drainage works ?
   (*b*) Name the Acts of the Government under which various Local Bodies are governed.

6. Government of Bombay have issued orders that water supply schemes should not be based with an Irrigation canal as source of supply. State the reasons governing the issue of these orders. Under what circumstances could the Irrigation and Water Supply Scheme be combined ?

7. What are the prevalent rates of wages for the following.—
   (*a*) Fitter (*b*) Mason (*c*) Carpenter (*d*) Oilman (*e*) Cleaner (*f*) Boiler attendant (*g*) Black-smith (*h*) Mazdoor.

8. How will you carry excavation for a sewar in a rock of 6′ deep in a town area and a mile away in open land ? State the rates you will estimate for the job in the two places. What is the rate of excavation in murum and soil in your District ?

9. How do you measure the following and quote rates prevalent.
   (*a*) Manholes and Inspection chambers, Valve chambers.
   (*b*) Country teak wood door and windows.
   (*c*) Laying and jointing 6″ and 9″ C. I. Pipes.

10. What are the hire charges for the following as per orders in force.
   (*a*) Road roller.
   (*b*) Machinery such as pumps, compressors and Engines.
   (*c*) Tools and tackle.

11. What percentage of depreciation you will assume for the following :
(*a*) Machinery.
(*b*) Pipes, specials etc.
(*c*) Buildings.

12. What is meant by a fishing tool ? Name some of them.

13. What are the prevalent rates for—
(*a*) Cotton waste (*b*) Rubber packing (*c*) Emery paper (*d*) Leather bucket valves—2″ diameter (*e*) Manila Rope (*f*) Wire Rope.

14. What precautions you will take before finished articles such as castings, moulddings etc. are sent out from the workshop ?

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT CIRCLE—BARODA.

ACCOUNTS AND RULES OF P. W. D. (Oral).

Wednesday, 12th July 1950.

		Marks.
1.	(*a*) What are advance payment, secured advance and when is each admissible ?	6
	(*b*) When are duplicate and triplicate receipts issued ?	4
2.	(*a*) What are earnest money, security deposit and solvency certificate ? When is each called for ?	5
	(*b*) In what way is schedule B, prepared in case of lump sum contract ? What form is used for such contract ?	5
3.	(*a*) What are the usual items of revenue receipts in a Sub-division and how do you control them ?	5
	(*b*) Can quantities of items of work in a contract be changed and if so, how is the contractor affected ?	5
4.	(*a*) What is survey report, sale account and rent note ?	5
	(*b*) How are urgent works started in anticipation of allotment ?	5
5.	(*a*) What items pass through purchase Account ?	4
	(*b*) What action would you take when cash in chest is found to be surplus or deficit at the end of month ?	6

Marks.

6. (*a*) When can tools be lent to contractors and pieceworkers and ratelist holders ? 6

(*b*) Can Deputy Engineer accept negotiated tender when rates are within sanctioned estimate cost of which is below Rs. 5,000 ? 5

7. (*a*) What are departmental note books and measurement books ? 4

(*b*) What will you do when—
(*i*) a voucher is lost, and
(*ii*) cheque is lost ? 2

(*c*) What is a requisition ? Up to what limit can you make purchases on the same ? 2

8. Define—
Cash balance report, Certificate of counting of cash, Voucher, Legal tender. 6

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II

GUJARAT CIRCLE—BARODA.

ROADS AND BUILDINGS.

(With special reference to modern type of road construction.)(Oral).

Thursday, 13th July 1950.

Marks.

1. What do you mean by modernised surface for roads ? What are the different types in vogue generally ? Which would you prefer and why ? 8

2. (*a*) What is cutback emulsion ? What properties are usually considered for grading and specifying asphalt ? 4

(*b*) Which type can be used in cold process ? 2

(*c*) What is surface dressing, seal coat, premix grout and semigrout ? 4

3. What is creep in concrete pavement ? Why are dowel bars used at joints of slabs ? What is bonded concrete ? What are anchor rods in cement concrete road and when are they used ? 9

Marks.

4. In a sandy bed what types of foundations would you adopt for (hard strata not available within economical depth).
(i) Small slab drain (ii) culvert of 12' span (iii) large bridge. 9

What is usually maximum siz of Hume pipes used ? 2

What is thumbrule for designing slab drains for catchments of 100 acres and 100 to 700 acres ? 5

5. What do you understand by—
(i) road chart-C, (ii) hydrographs (iii) road metal rate book ? 6

6. (a) What is cross-fall and camber ? What cross-fall do you keep for water bound macadam, asphalt and concrete roads ? 5
(b) What is ruling gradient ? How does it vary for different types of country ? 5

7. Define (i) Control line, building line, (ii) quoins, underpinning bricknogging. 5

8. Why do you blind the roads ? What is mechanical interlocking of metal ? What is height of sign boards from ground ? What are relieving arches and when are they used ? 8

9. What are rates for (i) B. B. Masonry in cement mortar 1 : 6 (ii) Cement plaster 1 : 4, (iii) earthwork for roads ? 3

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, CLASS II.

GUJARAT CIRCLE—BARODA.

IRRIGATION AND IRRIGATION ACT. (Oral).

Thursday, 13th July 1950.

Marks.

1. What do you understand by—
1. Block,
2. Adsali,
3. Delta,
4. Free-board ? 12

2. What precautions you will take in making a new bank of a canal ? 13

3. What action has to be taken in case of a serious breach in canal ? 13

Marks.

4. What procedure is to be adopted when another person desires to be a partner in a water course ? 13

5. What is collective farming on co-operative lines and what are its advantages and disadvantages ? 12

6. Can persons employed on canal take anyone ain custody, and under what circumstances ? 12

EXAMINATION IN P. W. D., ACCOUNTS.
(For Upper Subordinates).

9th October 1950.

WRITTEN PAPER.

(Time : 3 hours—11-00 A. M. to 2-00 P. M.) Marks.

1. Post the following transactions in the cash Book, close the Cash Book and record certificate of count and verification of cash balance under your signature as Sub-divisional Officer :

Aug. 50.
21st—Cash balance B/F from the last account :

	Rs.	a.	p.
Cash in hand ... ... (Exclusive of revenue stamps worth annas ten).	60	4	6
Imprest with the Storeclerk " X "...	55	0	0
Drew cheque for replenshing cash in chest	300	0	0
23rd—Recouped imprest of Storeclerk " X " by cash as under and reduced it to Rs. 25-0-0 :			
(1) Freight charges on stationery received from the Head Office.	5	4	0
(2) Demurrage charges on materials received from M/s. Parry & Co., Bombay, paid by debit to Misc. P. W. Advances ...	9	11	0
(3) Cost of one rubber stamp ...	1	8	0
Advanced Rs. 287-9-0 to the S. O. for making payment to labour at Anand.			

		Rs.	a.	p.	Marks.
29th—	Received from Shrimati M. G. Kulkarni fees for the inspection of electric installation	300	0	0	
Sept.					
2nd—	Paid muster roll amounting to Rs. 287-9-0 by debit to the work of "Providing electric installation in the Students' Hostel at Anand "...	250	0	0	
	(The undisbursed amount was returned to the chest).				
	Paid into Treasury as Misc. P. W. cash receipts	300	0	0	
8th—	The total amount of cheques received on 6th B/F. from the subsidiary register	1,270	1	0	
	Received on account of sale of tender forms for the work of "providing additions to the Civil Hospital, Ahmedabad"	8	0	0	
	Paid into Treasury as Misc. P. W. Cash Receipts	1,278	1	0	
15th—	Paid bill of Messrs. Parry & Co., Bombay, after deducting Rs. 9-11-0 paid as demurrage charges on their behalf on 23rd August 1950 ...	372	0	0	
	A demand draft for the difference of pay of workcharged persons made permanent in 1945 received from the head office was presented at the Treasury and cashed	47	8	0	
19th—	Received inspection fees of electric installation	90	0	0	
	The above amount was sent with the peon for remittance into the Treasury, but he was robbed on the way and the money could not therefore reach the Government Treasury.				
20th—	Cash found short	1	4	0	35

2. An Upper Subordinate drawing officiating pay of Rs. 184 +p.p. Rs. 48 and conveyance allowance of Rs. 30 was transferred from Bombay to Nasik in the month of August 1950 in the interest of public service. He has in his family his wife, two children of 14 and 10 years of

Marks.

age an aged mother fully dependant upon him, and one servant. Prepare his travelling allowance bill and ascertain what T.A. will be due to him.

(*Note*—Inter Class fare from Bombay to Nasik is Rs. 5–8 by Mail or Express and Rs. 4–10–0 by passenger train. II Class rail fare is Rs. 8–12–0. Distance between Bombay and Nasik if 117 miles and the rate of conveyance of personal effects is 9 pies a mile by goods train. The distance between his residence and the Railway Stations at Bombay and Nasik is 2 miles and the rate of mileage allowance admissible is annas 3½ per mile for II and III grade Government servants. The road mileage admissible for transportation of personal effects is annas three for the first two miles in Bombay and 9 pies per mile at Nasik). 25

5. Comment on the following transactions :—

(i) An amount of Rs. 145 (Rs. 100 + D. A. Rs. 45) remaining unpaid on 1st September 1950 was credited to "P.W.' Deposits" in the Cash Book by the Executive Engineer with a view to keep proper watch over the undisbursed amount.

(ii) An Executive Engineer sanctioned an excess of Rs. 501 over the estimated amount of the work of "Providing electric installation in the Girls' Hostel at Charni Road, Bombay".

(iii) Tenders were called for publicly by the Deputy Engineer, Bombay, for a certain work estimated to cost Rs. 6,000. The lowest tender was obtained for Rs. 6,405. The Deputy Engineer sent the tender to the Executive Engineer and it was accepted by the latter.

(iv) A motor lorry in the Divisional Office was badly damaged in a road accident. The Executive Engineer prepared an estimate for Rs. 2,500, sanctioned it and got the lorry repaired.

(v) The Storekeeper complained that the imprest of Rs. 400 given to him by the Executive Engineer was too inadequate for his requirements, whereupon the Exceutive Engineer raised it to Rs. 650 as a special case.

(vi) A tender amounting to Rs. 4,000 was accepted by the Supervisor officiating as Dy. Engineer in the Bombay Sub-division. The case was referred to the Electric Engineer to Government who condoned the irregularity.

Marks.

4. Write short notes on :—

(1) Transfer Entry Order; (2) Work Abstract; (3) Account of Expenditure and liabilities; (4) Contractors Ledger (5) Reduced Estimate.

OR

What steps must be taken when :—

(a) A refund of deposit is made to a contractor.

(b) The final bill of the contractor shows that he has been overpaid.

(c) Receipts are utilized for departmental expenditure.

(d) A running account bill amounting to Rs. 10,001 is received in the Divisional Office from the S.D.O. for payment. 15

Note—Cash Book and T.A. Bill forms will be supplied.

EXAMINATION IN P. W. D., ACCOUNTS.
(For Upper Subordinates.)

9th October, 1950.

Marks.

(Oral).

1. What do you mean by the term " Voucher "? When can it be said to be complete ? 10

2. What procedure have you to adopt to execute an item of work not provided for in the tender ? 10

3. If some of the labourers employed on muster roll are absent at the time of making payment, how should their wages be dealt with ? 8

4. How is cash obtained for payment ? What payments can be made by cash ? 9

5. What is the period of a cheque's currency and what is the least amount for which a cheque can be drawn ? 8

6. What will you do if a mistake in the Cash Book is found (1) before, and (2) after you send its copy to the Executive Engineer ? 8

Marks.

7. State the main points to which you will pay special attention if you are asked to audit a travelling allowance bill. 15

8. State how undisbursed pay and allowances are dealt with in the Sub-divisional and Divisional Offices. 12

9. How are cash receipts from other sources dealt with and accounted for by (*i*) a drawing officer, and (*ii*) an imprest holder ? 9

10. Define the terms "Contingent Charges" and "Contingencies (works)". State at least four items falling under the former. 12

EXAMINATION IN THE INDIAN ELECTRICITY ACT AND THE RULES MADE THEREUNDER.

(For Supervisors).

Tuesday, 10th October 1950.

(Time 3 hours:—11 A. M. to 2 P. M.)

Marks.

1. What are the powers of a licensee under the Indian Electricity Act for opening or breaking up of streets, railways, and tramways for laying supply lines ? 10

2. Define—

(1) Area of Supply ; (2) Compulsory Area ; (3) Electric Supply Line ; (4) Mains ; (5) Distributing Mains ; and (6) Service Lines. 12

3. Is a licensee allowed to place an aerial line within 5 yards of the telephone or telegraph line ? What precautions are to be adopted when supply line crosses over or under a telephone or telegraph line ? 8

4. What procedure should a licensee follow if a consumer neglects to pay any sum due from him ? 10

5. When shall a meter be deemed to be incorrect ? What procedure should be adopted by a licensee if a meter which is the property of a consumer is found to be incorrect ? 10

6. If a consumer wants a supply, what procedure should be followed ? When can the licensee refuse to give the supply ? 15

Marks.

7. What provisions are required to be complied with by a consumer and a licensee when using and supplying energy at a high pressure ? 15

8. Which disputes are referrable to an Electric Inspector under the Indian Electricity Act ? 10

9. What requirements are to be complied with when a 3 phase medium pressure service is brought into a building and is used for lighting and motive power ? 10

BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS.

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS.

1950

PRACTICAL TEST.

Time—3 Hours

Marks.

1. What are the permanent and temporary adjustments in the levels given to you. 10

2. (*a*) Find out the angle of elevation of the tower of University from the given point by using the theodolite given. 4

   (*b*) Determine the height of the tower. 6

3. Set out the foundation lines of the plan given ... 20

4. Determine the area in acres (excluding the shaded portion) of the sketch plan given by using the plani meter. 10

ACCOUNTS AND RULES OF THE P. W. D.

Oral.

1. Explain the following terms : 15

   (*i*) Pass Book.

   (*ii*) Transfer Entry order.

   (*iii*) Issue Rate.

   (*iv*) Triplicate receipt Book.

   (*v*) Contractors Ledger.

2.(*i*) What is the difference between Stock account and material at site account ? 12

   (*ii*) How are these accounts maintained ?

3.(*i*) What is the maximum amount of leave admissible to Workcharged Establishment ? and 12

   (*ii*) What are the conditions of grant of such leave ?

4.(*i*) What are the different forms of tenders ? 12

   (*ii*) When do you use each ?

5.(*i*) What are the main points to be considered before paying a second advance to a Contractor against materials ? 12
and
(*ii*) What precautions are to be taken ?

6. What action will you take when : 12
(*i*) Surplus cash is found in the chest ?
(*ii*) Deficit cash is found in the chest ?

ACCOUNTS AND RULES OF THE P. W. D.

(Written Paper.)

Time—2½ Hours.

(Attempt any SEVEN questions aggregating to 75 marks. Question No. 1 is compulsory).

1. Post the Sub-Divisional cash book of a Sub-Division showing the following transactions. 15

August 1950.	Rs.
1st Opening Balance.	300
2nd Temporary advance given to Shri Kulkarni, Overseer by cash.	100
2nd Temporary advance given to Shri Rane, Junior Engineer by cheque.	250
3rd Sale Proceeds for mango trees in the Inspection Bungalow received from Seth Lalji.	100
4th Above amount remitted into Satara Treasury.	100
5th Cheque drawn for replenishment of cash	300
6th Cheque No.A/15340/10 dated 4th July 1950 drawn in favour of Messrs. Wadia & Co. for work done cancelled.	15,000
7th Paid by cheque No. A1/15340/40 dated 7th August 1950 to Messss. Parikh & Sons	
1. For providing Electric Installation work done.	3,500
2. Received security Deposit.	200
3. Received payment for materials supplied for the work.	150

Marks.

8th Received from Shri Kulkarni unpaid balance against the balance of Temporary advance given on 2nd August 1950. 20

9th Issued fresh cheque No. A/15340/43 in lieu of time barred cheque No. A/1520/10 dated 3rd April 1950 received from Shri Ranade & Sons for constructing power house at Satara. 20,000

Close the Cash book, Strike cash balance and give certificates of verification of cash balance.

2. What are the Powers to accept tenders of the following officers : 8
   1. Chief Engineer.
   2. Superintending Engineer.
   3. Executive Engineer.
   4. Assistant Engineer.

3. Enumerate the authorized forms of Contractors bills and vouchers used in the P.W.D. and state for what purpose each is used. 12

4. What are the following and when do you prepare them : 12
   (*i*) Revised Estimate.
   (*ii*) Supplementary Estimate.
   (*iii*) Reduced Estimate.
   (*iv*) Completion Report.
   (*v*) Completion Certificate.
   (*vi*) Workslip.

5. (*a*) What is an original work ; and Repair work ? 10
   (*b*) State the essential requirements that have to be fulfilled before any work could be started ?

6. Is it permissible to make payment of Daily labour through a contractor ? If so, in what circumstances ? Describe correct method of making such payment, if this can be made at all. 10

7. Distinguish between :
   (*i*) Earnest money and security Deposit.
   (*ii*) Sub-Work and Sub-head.
   (*iii*) Market and Future issue rate.
   (*iv*) Major Work and Minor Work.

8. State the financial and accounts documents which a S.D.O. working with a drawing account subordinate to an E.E. has to render to his E.E. 10

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, 1950.

SPECIAL ENGINEERING.

ROADS, BUILDINGS AND DAMS.

(Written Paper).

Time allowed 2½ hours.

Note.—Question No. 1 is compulsory. Any 5 questions from between Nos. 2 to 7 and 8 to 13 may be tried according to the special subject chosen by you.

The total marks for the questions attempted should not aggregate to more than 75.

1. Describe briefly how you would fix the high flood discharge of a stream with a catchment of (*i*) 20 sq. miles, and (*ii*) over 1000 sq. miles, for the design of (*a*) road bridge and (*b*) the spillway for a storage reservoir. 10

ROADS AND BUILDINGS.

2. Define and illustrate with sketches where possible; (*i*) Super-elevation. (*ii*) Camber, (*iii*) Elastic pavements, (*iv*) Ruling gradient, (*v*) Ribbon development, (*vi*) Confalt, (*vii*) Premix, (*viii*) Abutment pier. 12

3. An existing murum road is to be improved as an M.D.R. There is no change in the alignment. Prepare an estimate for this improvement for one mile of road. Assume a section for the existing road and the normal No. of minor cross drainage works.

4. How are roads classified in the P.W.R. plan of the Bombay State. Define each of them and give briefly the broad specification for each. 8

5. A residential bungalow of about 2000 sq. ft. plinth area giving the following accommodation is to be built. A sitting room, 2 bed rooms, a dining room, a kitchen, and necessary sanitary conveniences. Sketch a line plan and give line cross section of the building. Assume foundations. What would this structure cost (exclusive of land) in (*i*) Bombay and (*ii*) Moffusil? 15

Marks.

6. A row of rooms 15′×20′ each with a 5′ verandah in the front is roofed over by A.C. Sheets on cut-teak wood work. Sketch a cross-section of the building and show on it the dimensions of all the wood work, sheets etc. used, for the roof. 15

7. Describe the kinds of black topped roads you know of and state in what situation you would recommend the use of each. 8

Dams.

8. (*a*) Enumerate the requirements for the safety of an earth dam and very briefly the purpose of each. 8

(*b*) What is the usual factor of safety adopted for earth dam 3

Does this factor improve or decrease with time and why ?

9. (*a*) A valley in the Bombay Deccan is to be dammed It has the usual characteristics of black soil cover in the gorge and murum available nearby. The height of the dam is to be 50 ft. Draw a dimensioned section for an earth dam. 12

(*g*) If the gorge portion 30 ft. of soil is underlaid by 30 ft. of murum above rock, would you make any material change in your design ? If yes, what ? 5

10. You are inspecting an earth dam under construction. Describe what points you would specially examine during your inspection. 10

11. Explain and illustrate with sketches, where necessary 15

(*i*) Zoned section, (*ii*) Upstream blanket, (*iii*) Wellpoint drainage, (*iv*) Cohesion, (*v*) Electrical Resistivity method, (*vi*) Flow net, (*vii*) piping , (*viii*) Coefficient of permeability, (*ix*) Partial cutoff, (*x*) Riprap.

12. A diversion weir—a Bandhara—for a small irrigation channel of about 15 cusecs capacity is to be constructed across a nalla. Sketch a dimensioned section through the weir and also plans and elevation of the weir Assume your own data. 12

13. Explain what you understand by "Uplift pressure" and discuss the modern theory and practice with regard to the same. 10

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS, 1950.

SPECIAL ENGINEERING.

ROADS AND BUILDINGS OR DAMS.

Oral.

Answer. 1 and 2 to 6 or 7 to 11.

Marks.

1. What do you understand by the following : 15

   (*i*) Breaching section (*ii*) Curtain wall (*iii*) Core wall (*iv*) Falling contour (*v*) Breast Wall, (*vi*) Falling apron (*vii*) Floating foundation.

ROADS AND BUILDING.

2. You are constructing a bridge across a medium size river on a provincial highway. What sort of foundations would you provide in the following conditions of bed strata and why? 12

   (*i*) Unlimited depth of sand, (*ii*) 20 ft. depth of sand over lying rock ,(*iii*) Rock overlaid by 20 ft. of clayer topped by 20ft. of fully erodible block soil (*iv*) Stiff clay.

3. What rates would you provide at the present time in your locality for the following :— 12

   (*i*) Plinth area rate for a single story office block in brick and cement mortar.

   (*ii*) Wood work I class for doors.

   (*iii*) $4\frac{1}{2}$" cement concrete flooring.

   (*iv*) Brick masonry in cement in superstructure.

   (*v*) R.C.C. lintels.

   (*vi*) Blasting exposed trap rock in foundations and stacking materials.

4. (*a*) When and How would you repair pot holes in— 6
   (*i*) W.B.M. Surface, (*ii*) Asphalt carpet, (*iii*) C.C. Surface.

   (*b*) What, in your opinion, would be the average life of each of the above 3 kinds of roads. 3

   (*c*) What time would a steam roller take to roll a mile of 12 ft. width of new W.B.M.surface ? 3

Marks.

5. (*a*) Why is blindage spread on a road ? 2

(*b*) At what intervals is it spread. 2

(*c*) What is the quantity spread each time per furlong. 2

(*d*) What quantity will a mazdoor spread in one day from

(*i*) Pharas stocked on the road side. 2

(*ii*) Excavating borrow pits from the road side. 2

(*iii*) From the wind blown collections on the murum side shoulders. 2

6. (A) What thicknesses of walls (*i*) outer and (*ii*) inner partition would you adopt for each floor in a ground and 2 upper storey structure if the walls are of (*a*) rubble masonry and (*b*) brick masonry. 8

(B) How would you determine the load on the foundations of the outer walls of this structure. 4

Dams.

7. How many types of spillway can you think of ? Describe and state where each might be useful. 12

8. What are the following :

(*i*) Negative pressure, (*ii*) Retrogreesion, (*iii*) flood routing, (*iv*) reversed filter, (*v*) Infiltration index, (*vi*) Optimum moisture content.

9. (*a*) Enumerate the different types of waste weir gates you know of. 12

(*b*) Where would you use each ?

(*c*) Where will you locate the sill of a waste weir gate with respect to the apex of the ogee in a high dam and why ? 10

10. In your inspection you find that the toe of an earthen bund has become boggy for some length. What dangers do you see in this ? Is immediate action necessary. If so what immeidate action would you take. 12

11. An existing minor tank does not hold water for a long period though the catchment runoff is adequate. (*a*) What may be the probable reasons ? (*b*) Can these be obviated now ? and (*c*) If so, how ? 12

PROFESSIONAL EXAMINATION FOR DEPUTY ENGINEERS, 1950.

GENERAL ENGINEERING.

Oral.

Marks.

1. (*i*) How would you ascertain if the sand you are using is free from silt ? 10
   (*ii*) What are the characteristics of a good brick ?
   (*iii*) Why should cement concrete be cured ?
   (*iv*) What is the purpose of adding surkhi to lime mortar ?
   (*v*) What could be the possible reasons of lime plaster cracking in a building ?

2. (*a*) What are the current deductions for voids in (*i*) Rubble (*ii*) Road Metal, (*iii*) Sand ? 10
   (*b*) What points would you examine before fixing the site for an inspection bungalow.

3. State the usual. 10
   (*i*) Camber for a W. B. maccadam road.
   (*ii*) Cement concrete proportions in the foundations of a building in Poona.
   (*iii*) the usual hydraulic gradient through an earth dam.
   (*iv*) the top width and the batter adopted for a masonry retaining wall.
   (*v*) number of latrines to be provided per 100 labrours on works.

4. What are safe permissible loads on the following : 12
   (*i*) Black cotton soil.
   (*ii*) Thick grained loose sand.
   (*iii*) Hard murum.
   (*iv*) Moist clay.
   (*v*) Brick in cement mortar.
   (*vi*) Lime concrete.
   (*vii*) Coursed rubble in lime mortar.
   (*viii*) 1 : 2 : 4 cement concrete.

5. (*a*) What do you think is the daily output of per person— 5
   (*i*) Excavation in soft soil.
   (*ii*) Breaking 1½" trap metal.
   (*iii*) Rubble in lime masonry in hearting.
   (*iv*) Pointing of stone work.
   (*v*) Conveying soil by head load, lead 300 ft.

Marks

(*b*) What quantity can be conveyed per trip in each of the following cases. 5

(*i*) Soft murum in a bullock cart.
(*ii*) Trap metal in a 3 ton lorry.
(*iii*) Trap rubble in a bullock cart.
(*iv*) Unslaked lime in a bullock cart.
(*v*) No. of cement bags in a bullock cart.

6. How would you 12

(*i*) Remove old paint or varnish from wood-work or iron work.

(*ii*) Destroy vegetation and roots growing on masonry.

(*iii*) Pest of white ants from buildings.

(*iv*) Repair the damaged cement concrete floor below a masonry fall.

7. (*a*) Name 3 types of trees you would select and describe their charasteristics. Which make you select them for 5

(*i*) A road in heavy rainfall tract,

(*ii*) A residential colony.

(*b*) State the items and the provisions you would make for each of them if you were to prepare an estimate for such a platation. 6

PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS, 1950.

GENERAL ENGINEERING CONNECTED WITH ROADS, BUILDINGS, DAMS ETC.

(Written Paper.)

Time allowed 2½ hours.

Answer any 6 questions, aggregeting to not more than 75 marks.

1. You have to function a stone quarry departmentally. Describe the steps you would take, regarding the location and working of the same. 10

2. (*a*) Write briefly a set of specifications for all items involved in laying an R.C.C. slab 8″ thick. 11

(*b*) Draw a (sketch) section through the roof consisting of such a slab.

Marks.

3. Explain and illustrate as necessary :— 12
   (*i*) Damp proof course,
   (*ii*) Relief arch,
   (*iii*) Slump,
   (*iv*) Afflux,
   (*v*) Venturi flume,
   (*vi*) Sweating of dams,
   (*vii*) Bell mouthing,
   (*viii*) Soil stabilization.

4. What points would you note in particular while inspecting the following on the works ? 12
   (*i*) Burnt bricks,
   (*ii*) Rubble for masonry dam,
   (*iii*) Excavated open foundations,
   (*iv*) Lime plaster,
   (*v*) Cement pointing.
   (*vi*) Tile flooring in a building,

5. Give an analysis of the rates for the following items : 11
   (*i*) C. R. Masonry II sort,
   (*ii*) U.C.R. Masonry in gauged lime surkhy mortar for hearting in a dam,

   Assume and state your own rates for basic items like daily wages, cement, sand, etc.

6. Residential accommodation with modern conveniences is to be provided for several families in self contained units, of about 2,000 sq. ft. plintharea each, in different localities where the values of lands are (*i*) Rs. 200, (*ii*) Rs. 10, (*iii*) Re. 1 per sq. yard. 10

   Specify briefly the type for types of structures, you would design in each class of locality when the foundation conditions are,

   (*a*) 3 ft. soil, 3 ft. murum, and rock below ;

   (*b*) 15ft. loose soil and clay and rock below.

7. A tank is to be provided with a waste weir in a saddle to spill a maximum discharge of 25000 cusecs. The maximum rise of water above the crest of the weir is to be ristricted to 5 ft. Draw a section of the weir if it is to be (*i*) Clear over-fall, (*ii*) Partially submerged. Give supporting calculations. 15

OR

A large project for a new Provincial road is to be executed in convient stages. Assume any wearing surface.
(*i*) How would you split up the project ?

Marks

(*ii*) What would be the drawings required before the work is taken in hand ?

(*iii*) Enumerate the major items in drawing the specifications which you will pay particular attention to ?

8. Project for a small dam about 30 ft. high above the nalla bed is to submitted for administrative approval. 16

(*i*) State what assumptions you would make regarding the field conditions. (Rock is not exposed in the bed).

(*ii*) Enumerate the investigations you would make in the field and in the office for the project.

(*iii*) State what staff—in the field and the office—you would ask for and for what periods ?

OR

8. Plans and estimates for a major bridge Project in Bombay State (Catchment area 500 sq. miles. Rock not exposed in bed) are to be prepared for administrative approval. 16

(*i*) Enumerate the details of investigations required both in the field and in the office.

(*ii*) What staff would be required and for what period each ?

(*iii*) Indicate the site conditions including width and depth of water way etc. assumed by you.

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PROFESSIONAL EXAMINATION OF DEPUTY ENGINEERS

CLASS II nd

GUJERAT CIRCLE, BARODA.

Sanitary Engineering-Practical Test.

JULY 1950

WEDNESDAY, 12 th JULY 1950.

Set out a rectangular junction manhole 5'X3', 9 feet deep for drainage lines shown below, assuming necessary thickness of walls.

MARKS: 25.